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RAILWAY GAZETTE

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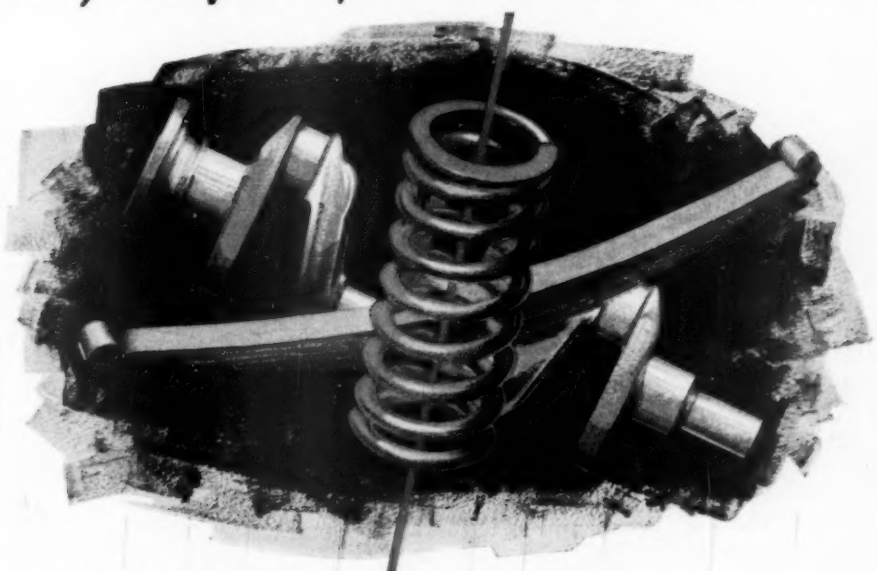

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In fact, there is hardly anything you do—anywhere you go—without enjoying the unseen help of R T B.

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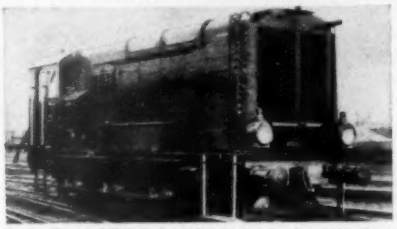

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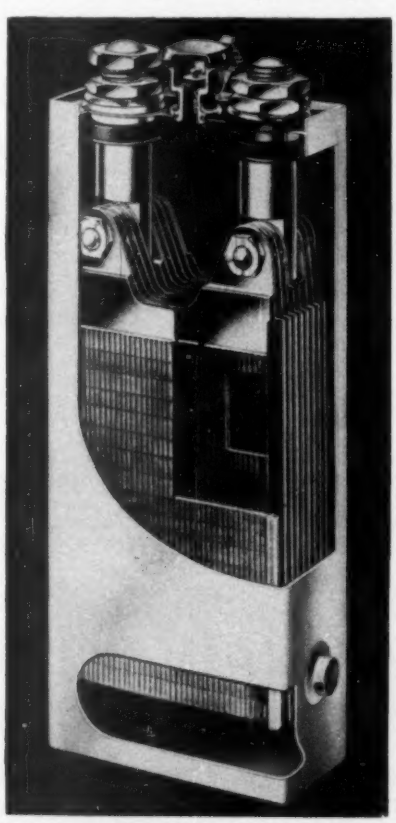

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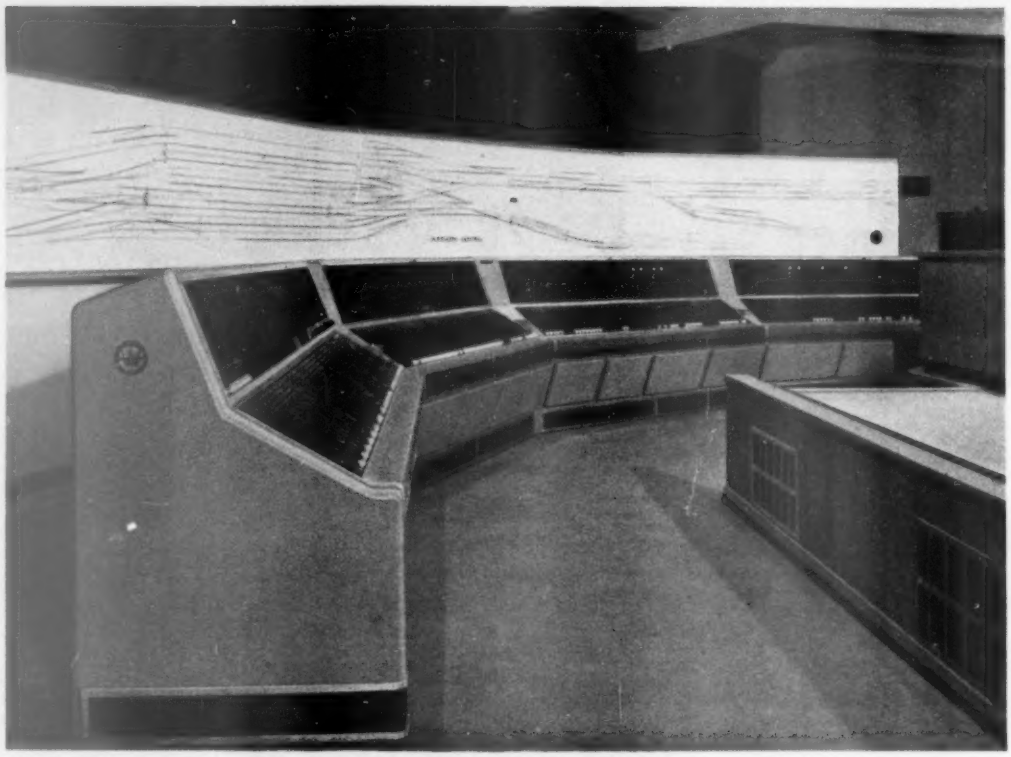

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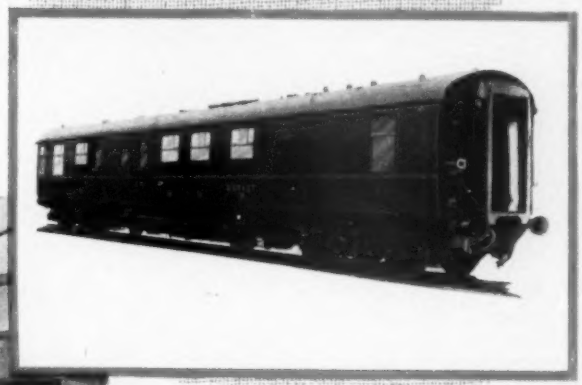

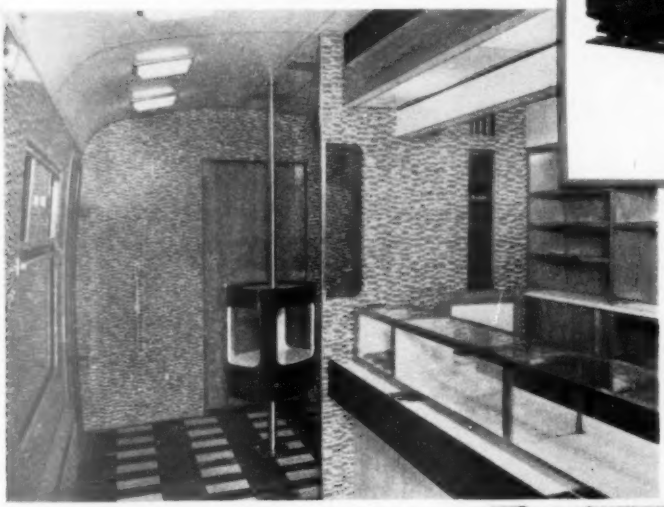

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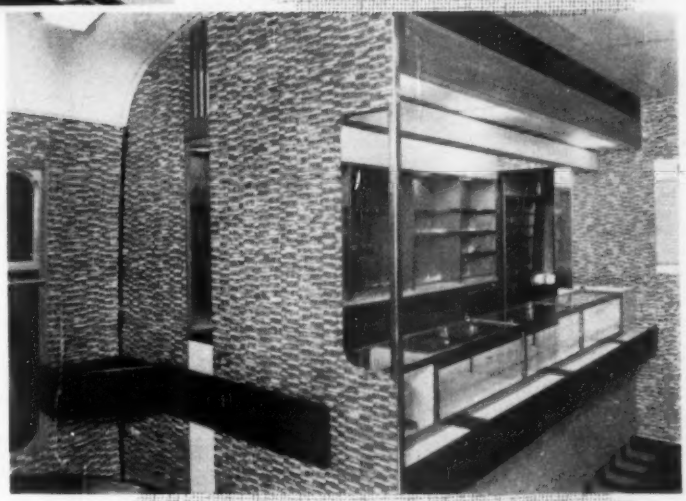

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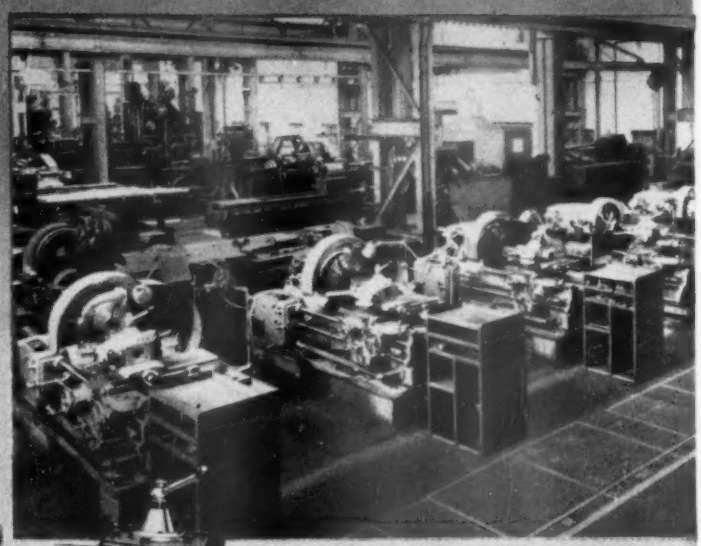

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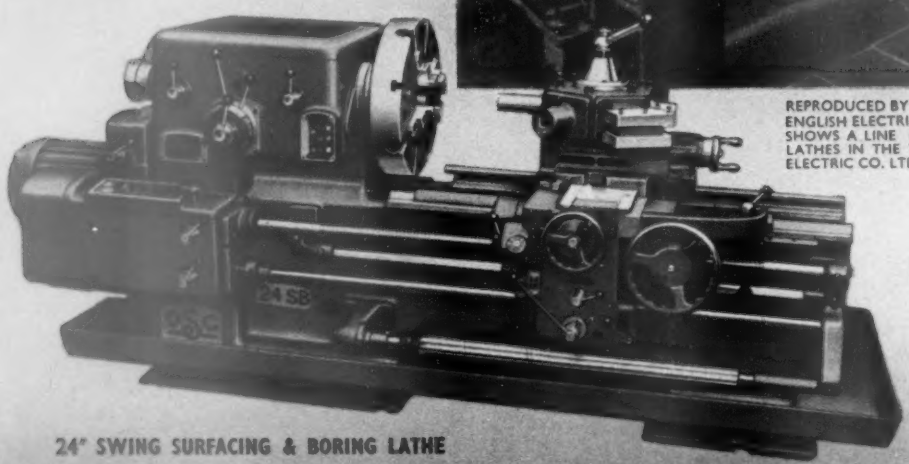

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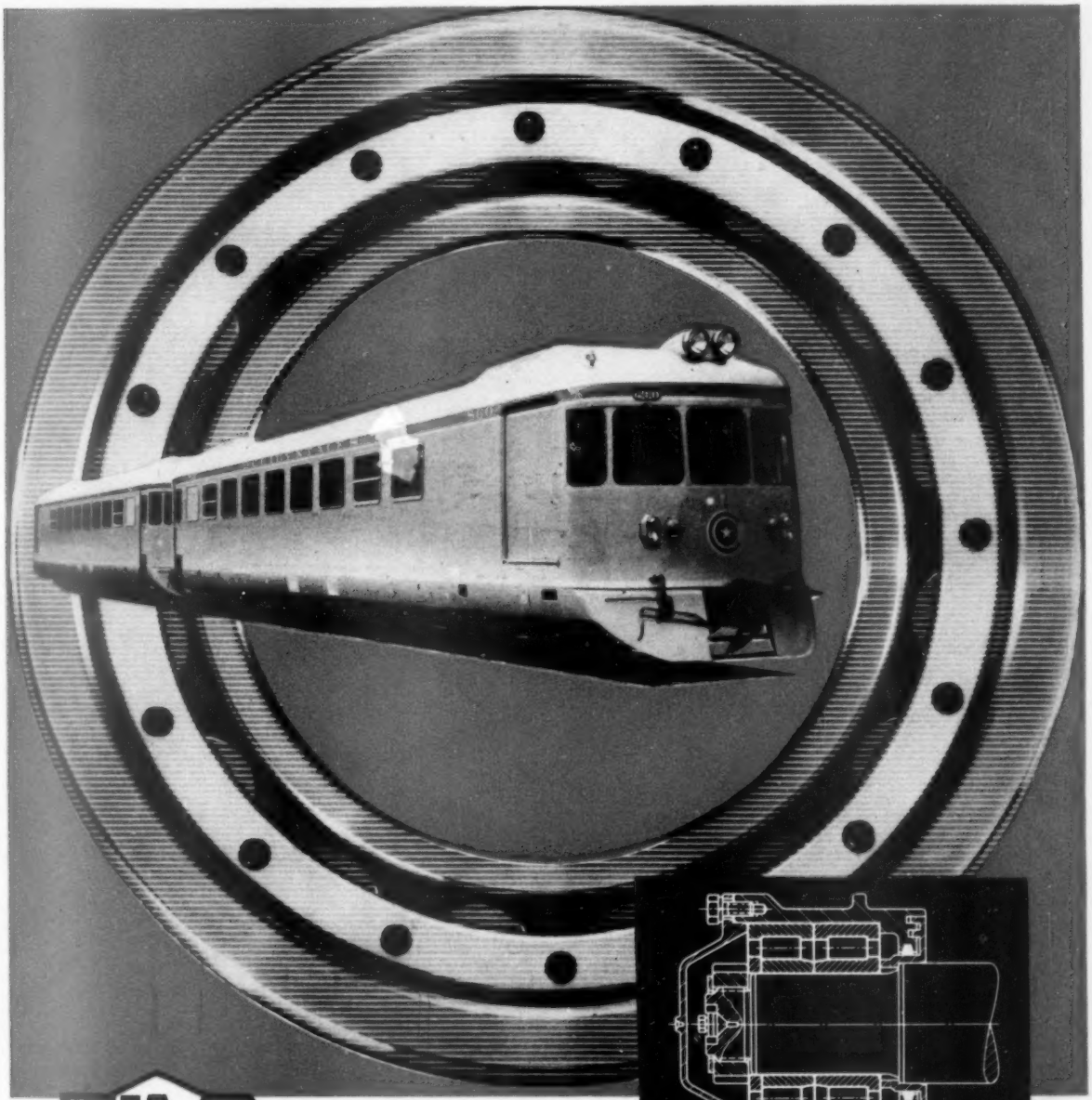

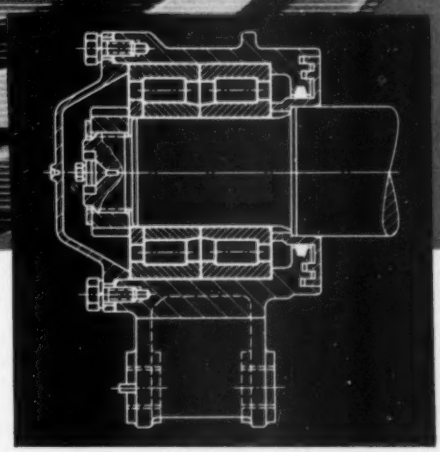

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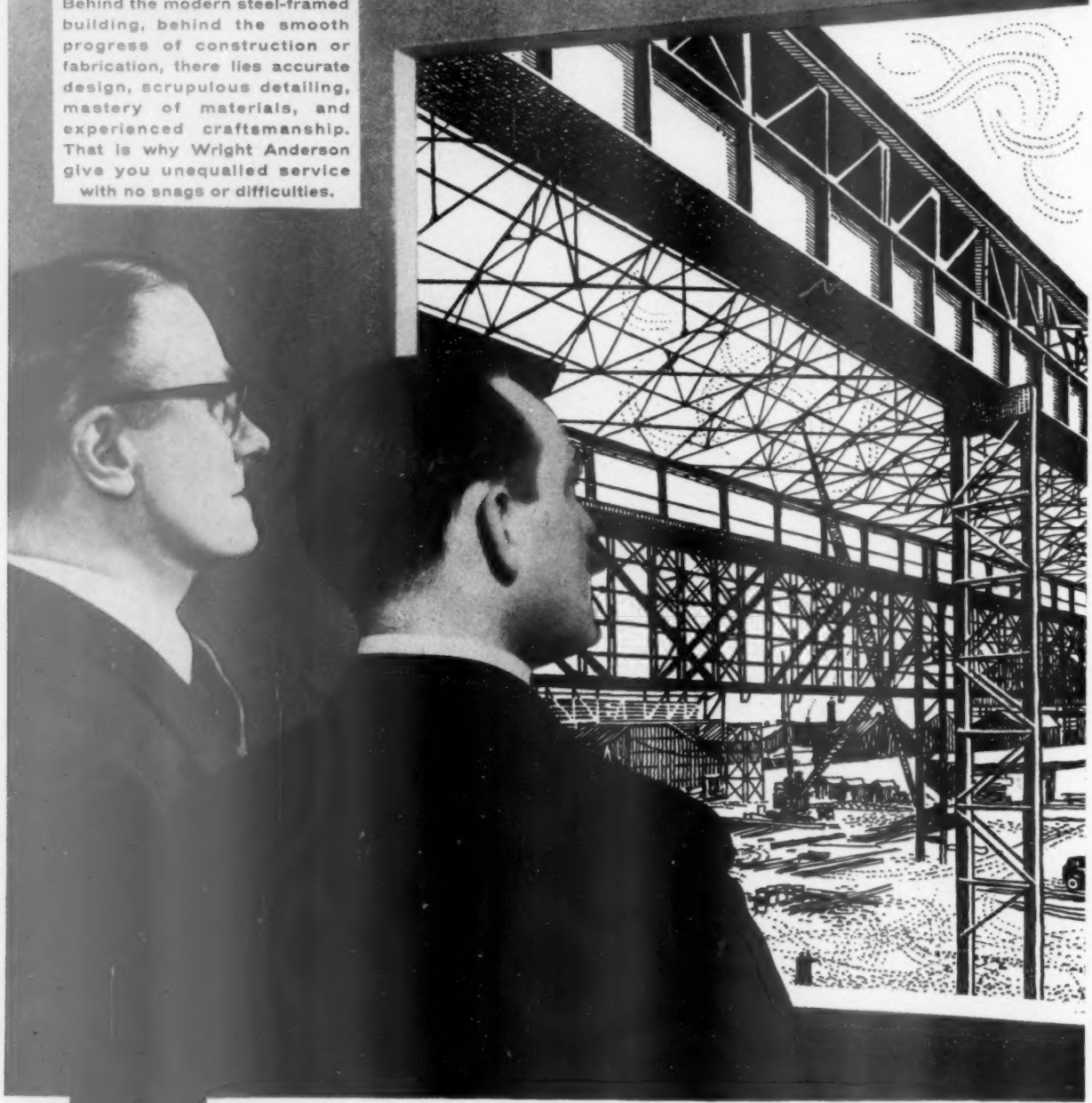

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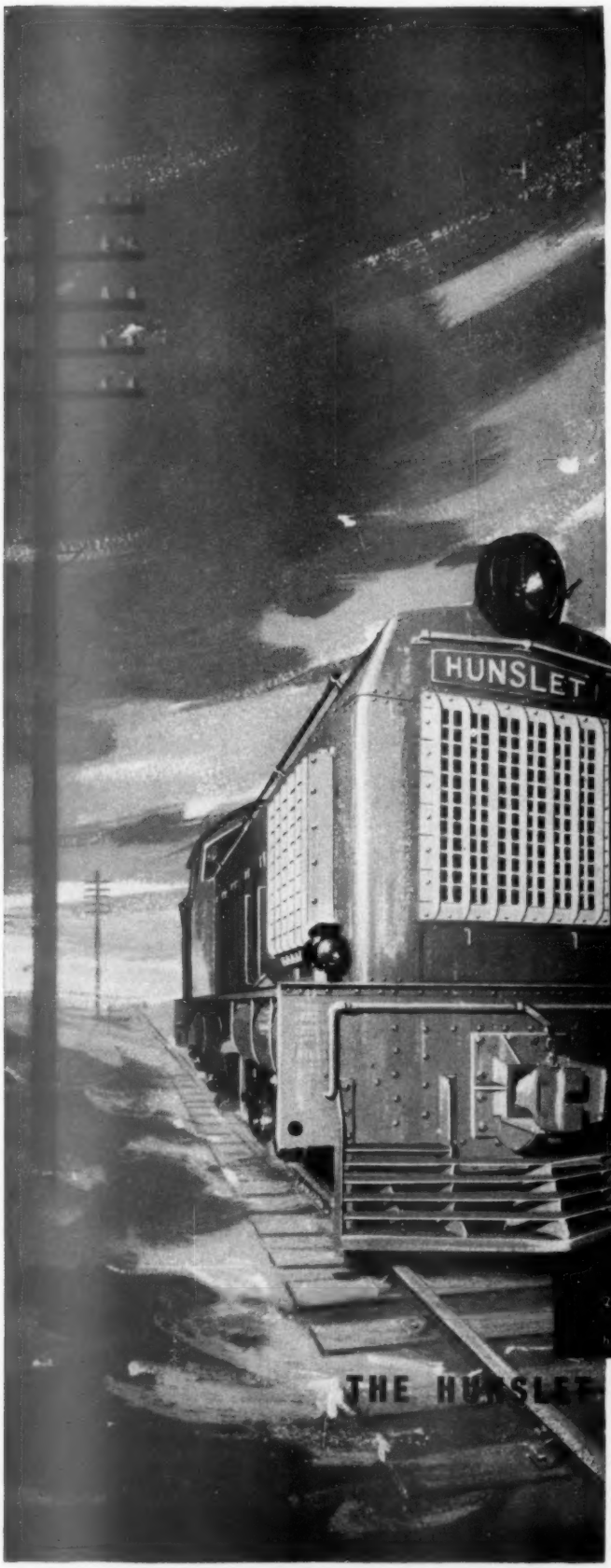

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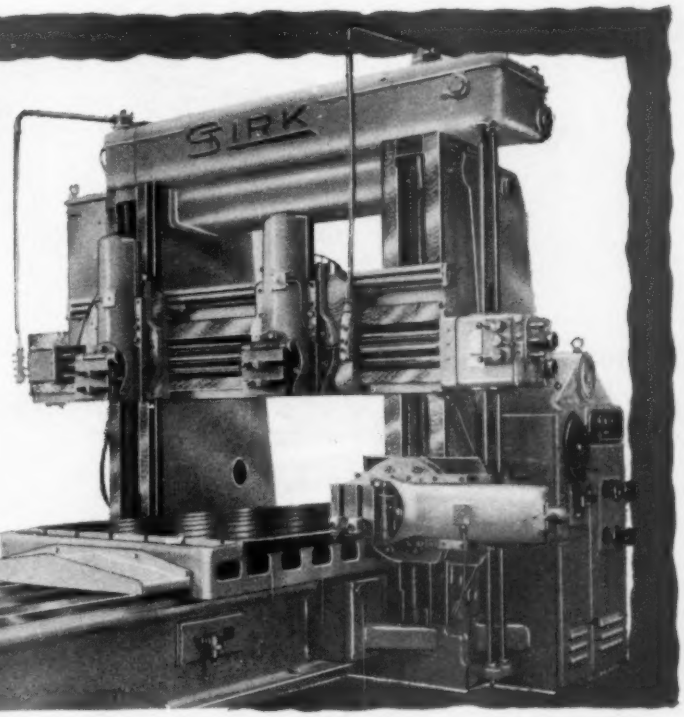

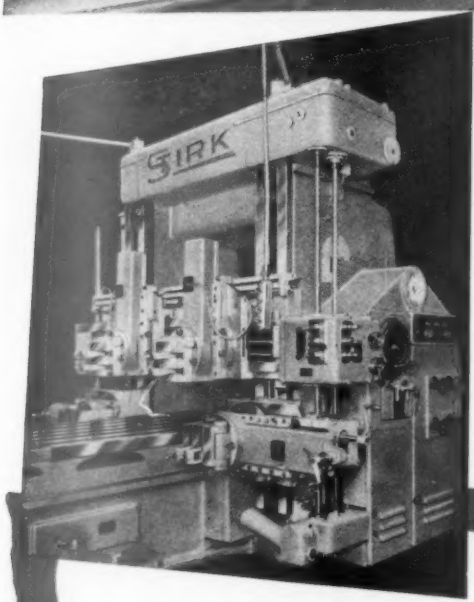

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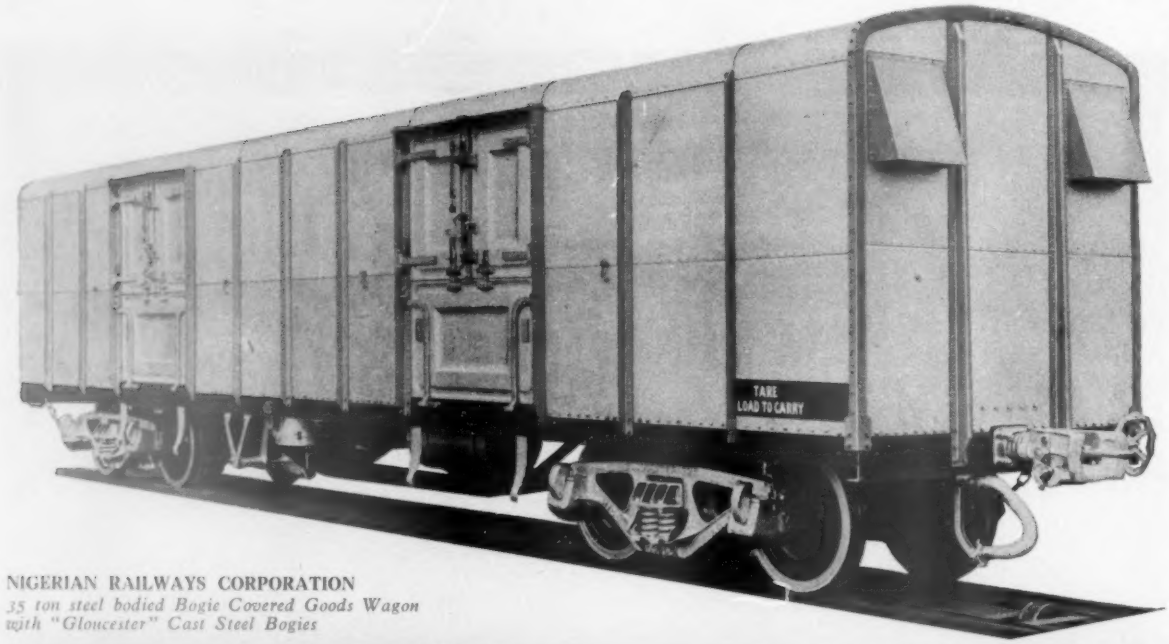

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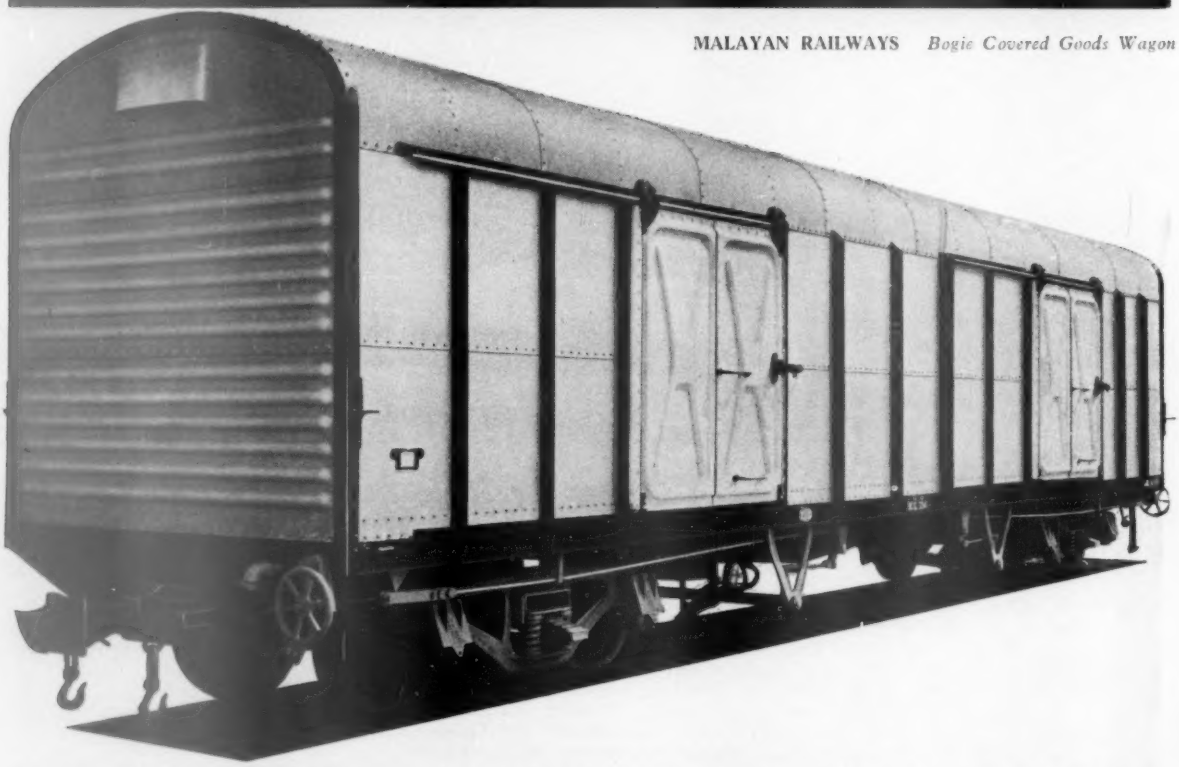

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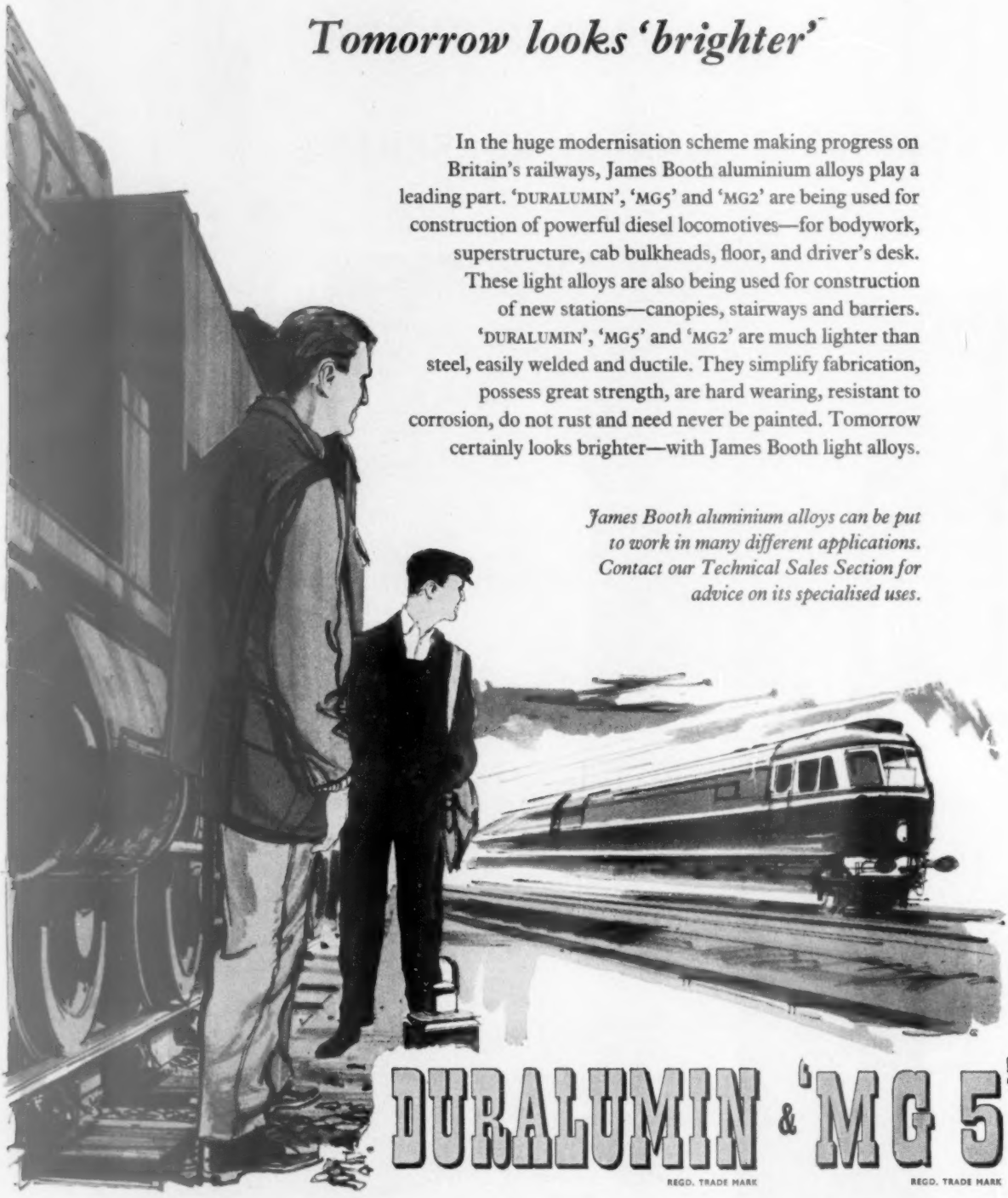

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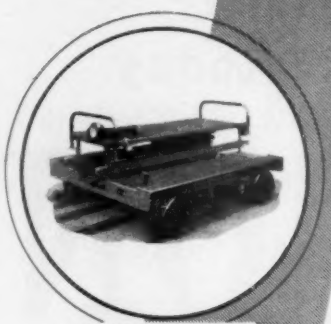
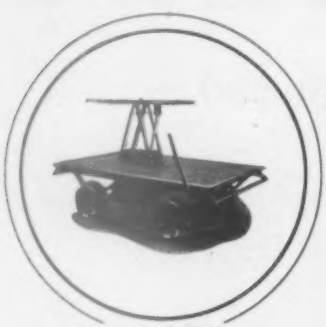
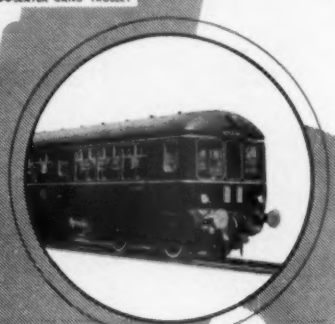


LIGHT 6-8-SEATER GANG TROLLEY

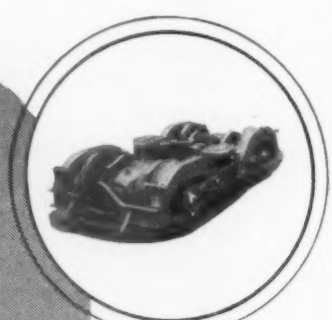
1-2-SEATER LIGHT INSPECTION TROLLEY



STEEL FRAME HANDCAR



MULTIPLE UNIT DIESEL RAILCAR



TWO AXLE DRIVE RAILCAR BOGIE

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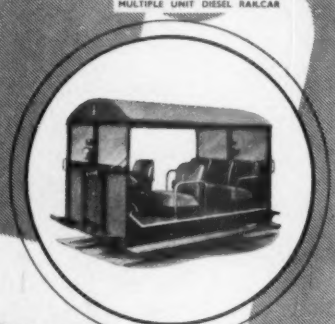
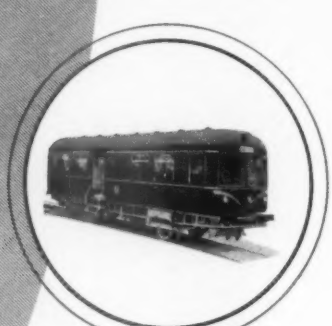


5-SEATER INSPECTION CAR



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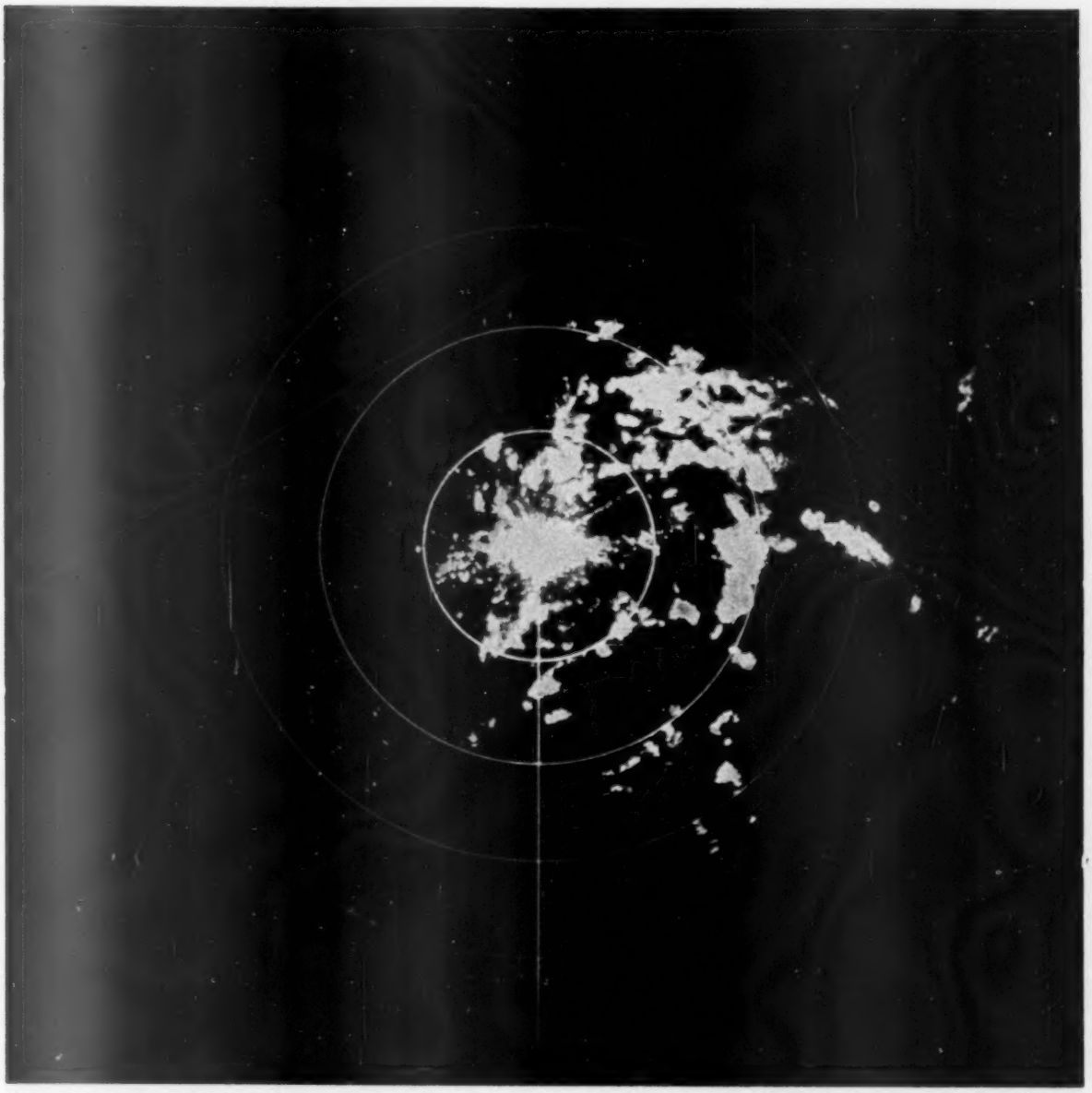

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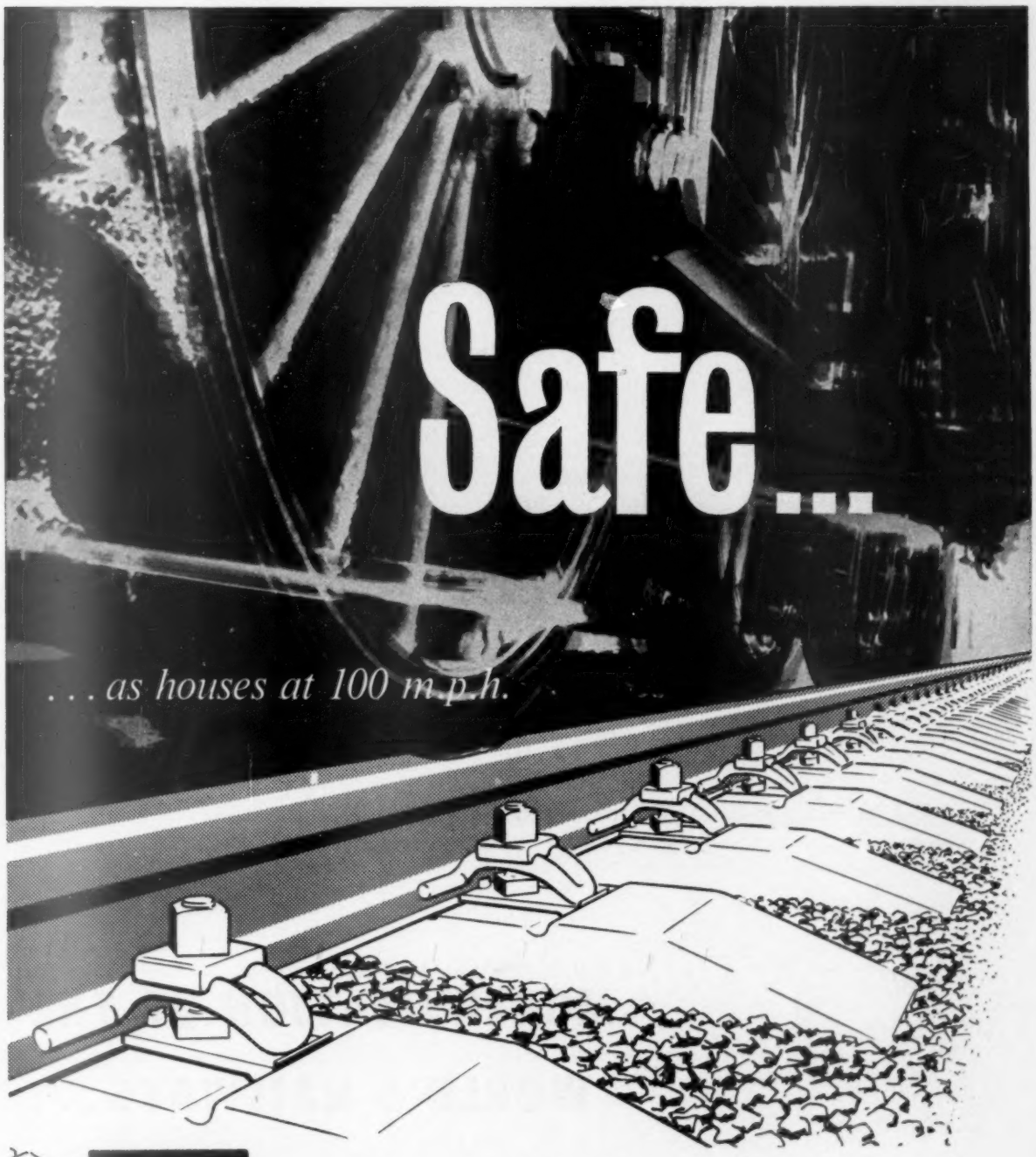

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B9

One of the 750 h.p. Bo-Bo diesel-electric locomotives for the Jamaica Government Railways. Similar locomotives are in service in Ghana, Nigeria, New Zealand and South Africa.

MODERNISATION OF THE WORLD'S RAILWAYS...

ENGLISH

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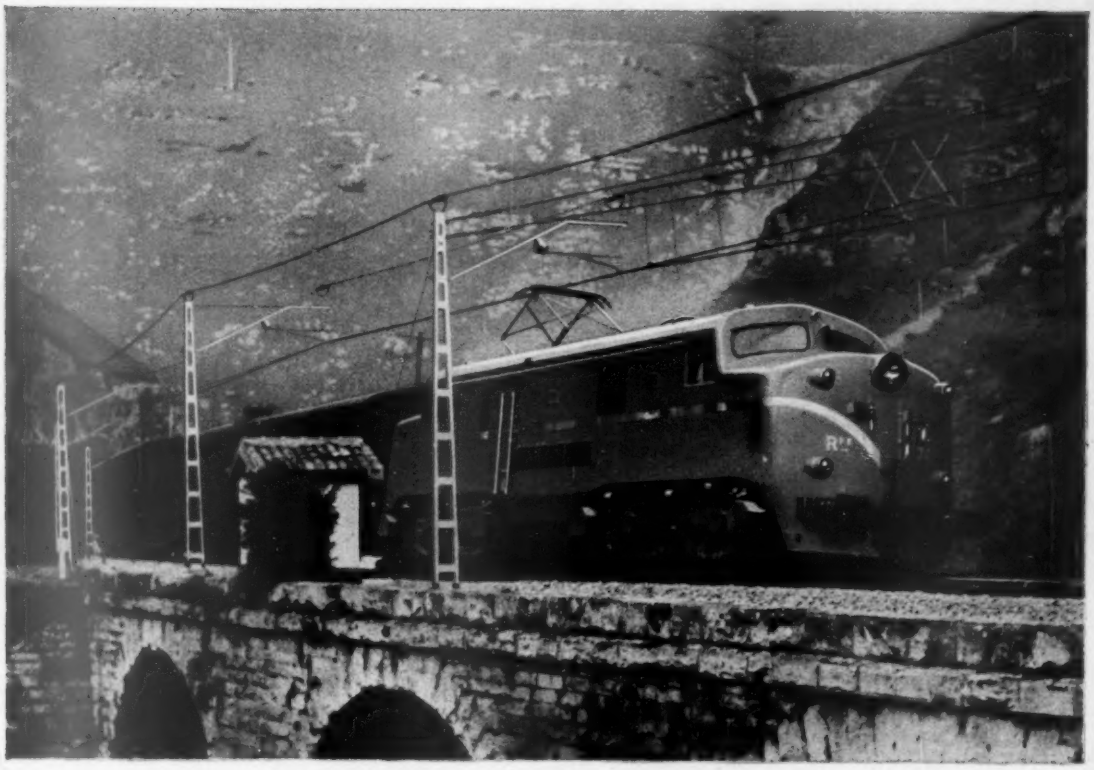
TDE.428



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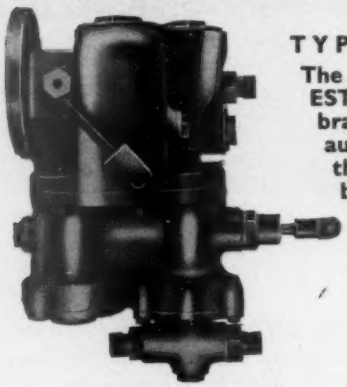
TYPE EST3d.

This standard and basic design of Triple Valve enables the controlled application and release of brakes on goods and passenger trains. It is suitable for all sizes of brake cylinder and is in accordance with the conditions laid down for the admission of goods and passenger trains for international traffic. Leaflet A.9.

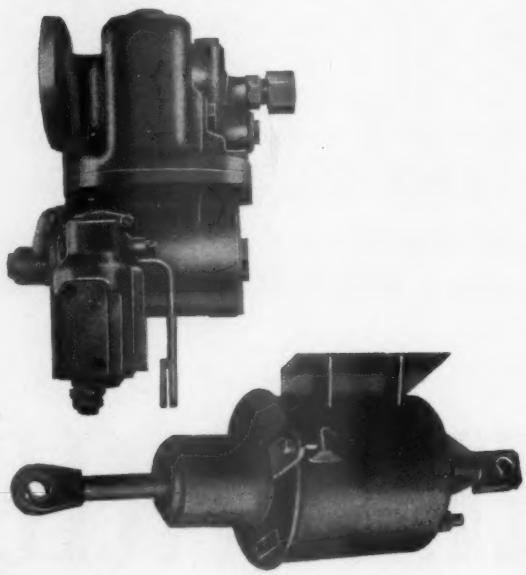


TYPE EST4d/AL.

The AL device used in conjunction with the EST Triple Valve, as illustrated, enables the brake cylinder pressure to be regulated automatically in proportion to the load on the vehicle, thus enabling the maximum brake efficiency to be obtained under all conditions. Among the advantages associated with this equipment are the simplicity of installation, further, the brake cylinder filling and releasing times are unaffected by load changes. Leaflet A.8

TYPE EST4d/R TRIPLE VALVE

In this instance the type R device has been added to the EST Triple Valve to enable two-stage braking to be obtained. This arrangement when applied to high speed passenger coaches and controlled by the vehicle speed enables the maximum brake efficiency to be obtained and greatly reduces the distance required for stopping a train. This style may also be used for simple load and empty braking with the two stages Hand controlled. Leaflet A.5.



TYPE SB BRAKE CYLINDER
(Made under licence from STABEG)

A simple lightweight design of Brake Cylinder embodying a patent piston seal giving automatic lubrication to the cylinder walls and exceptionally long life to the seal. A further patent covers a security device which simplifies maintenance and examination of the Cylinder which is made in all standard sizes and styles. Leaflet A.14.

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RG7

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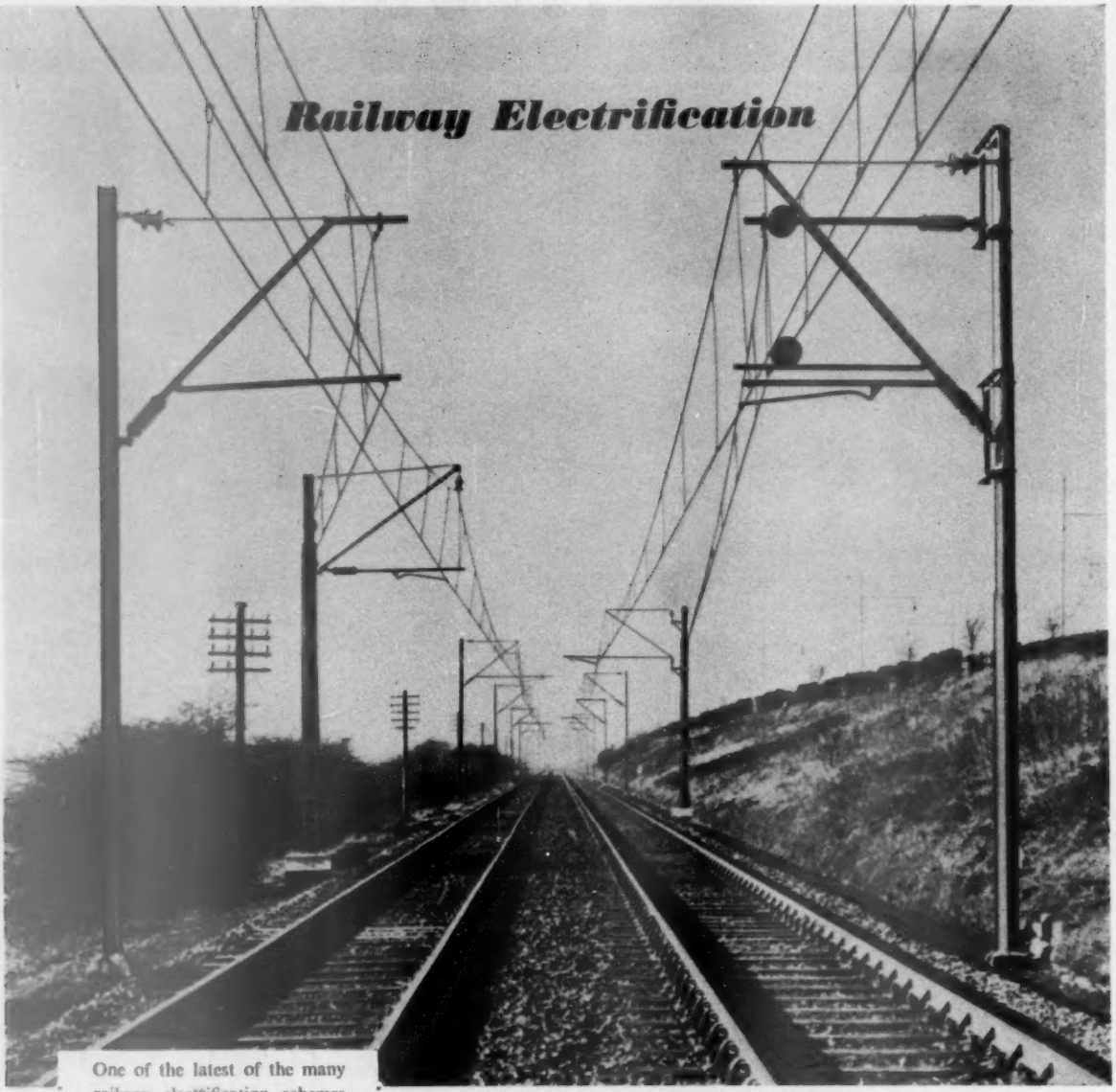
Railway Electrification



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BL16

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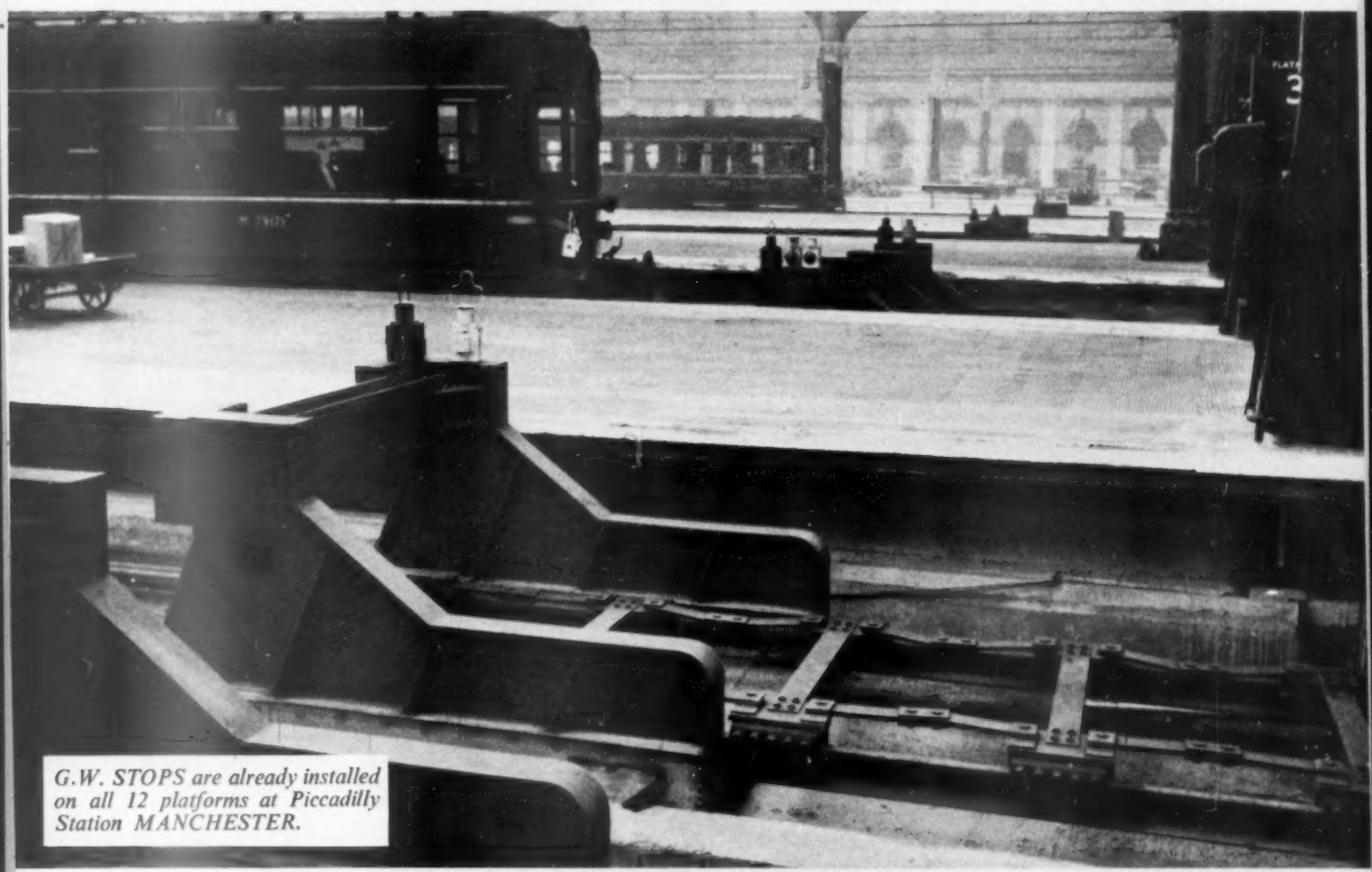
THE BUFFER STOP THAT...



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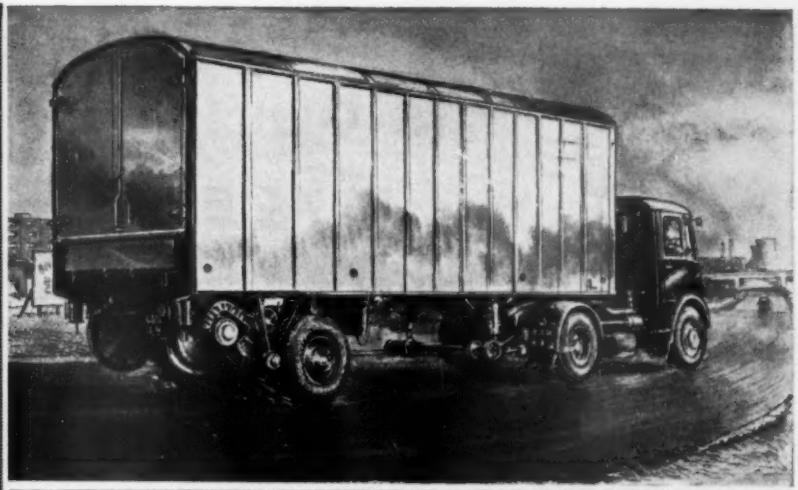
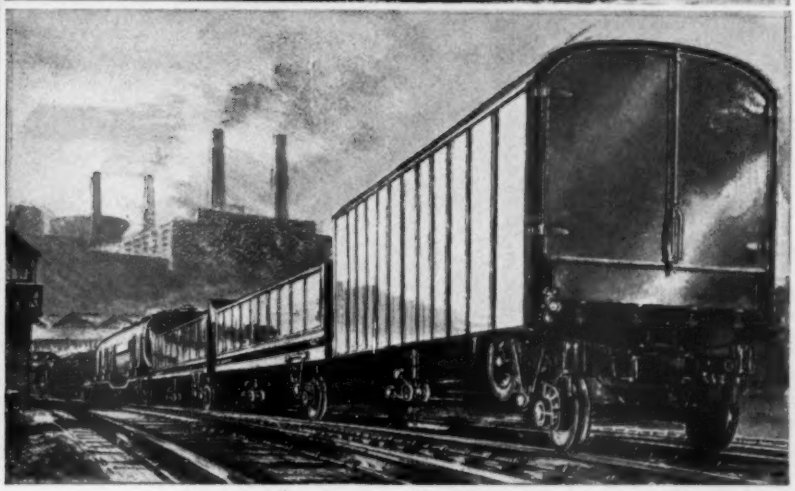
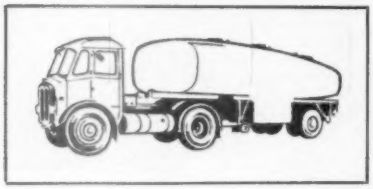
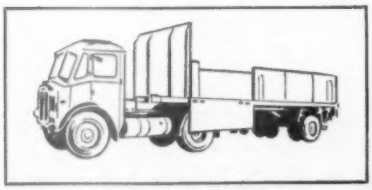


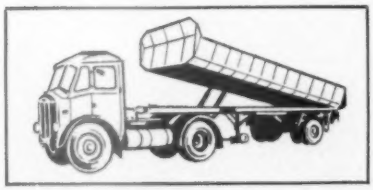




A Roadrailer Tanker



A Roadrailer Flat Truck



A Roadrailer Tipper Truck

The new ROADRAILER jointly developed by Pressed Steel Company and British Transport Commission, and made by the Pressed Steel Company, has both road wheels and rail wheels that can be interchanged in moments. Here is a vehicle that, as a van, a tanker, a flat truck with detachable sides or a tipper truck, can be driven right into a factory. The Roadrailer has combined the advantages of the railway's cheapness and speed for long distances with the convenience of driving from door to door, making possible an overnight service to any part of the country. The Roadrailer is designed for use with existing heavy duty prime-mover vehicles.

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It could be any of these and more,
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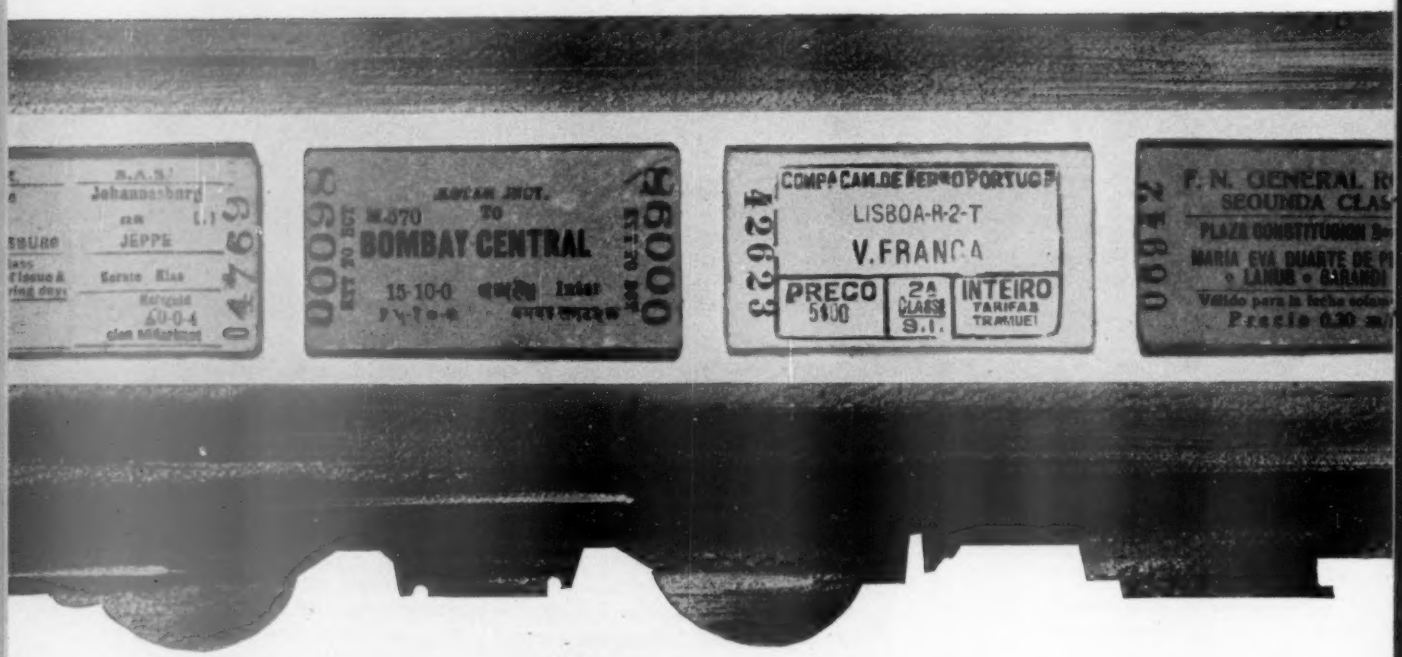

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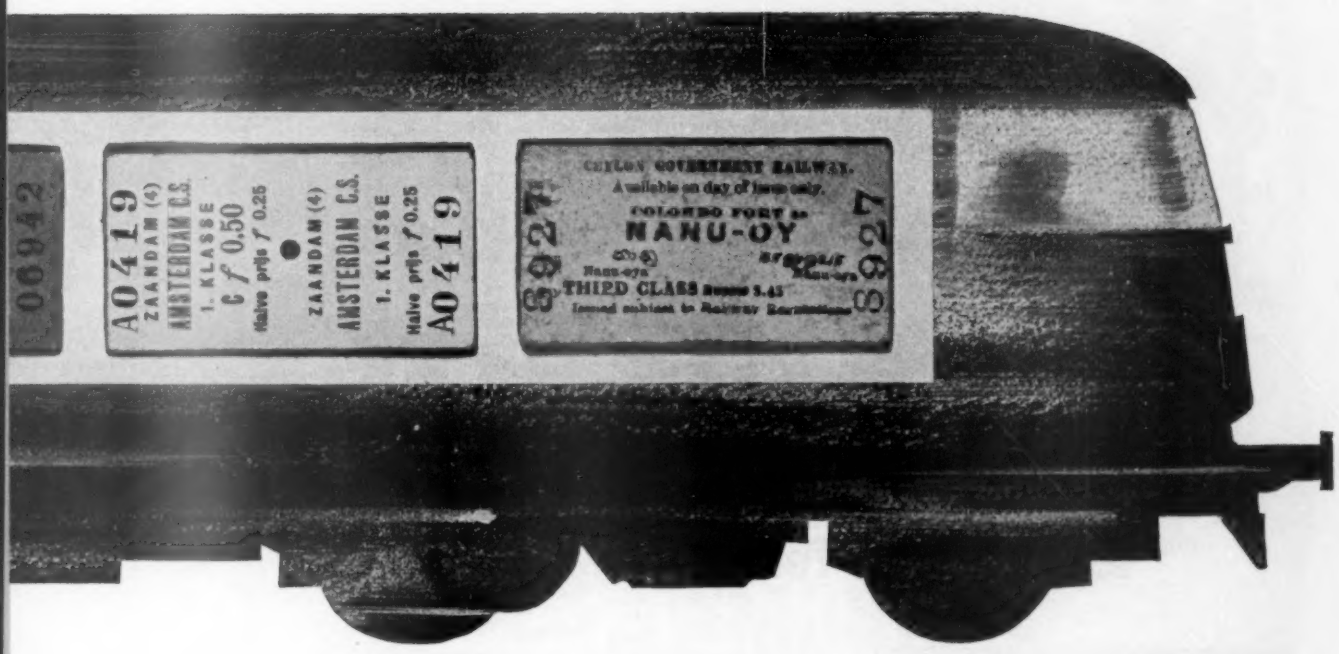
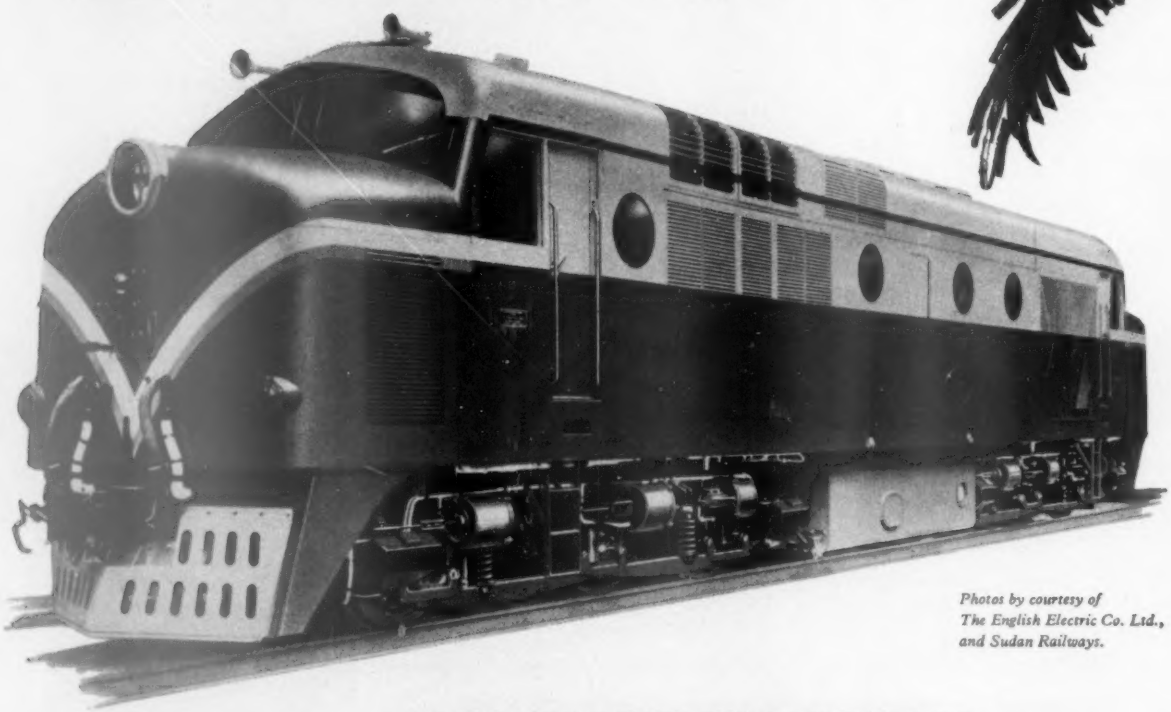


EXPERIENCE OF G.E.C.

GRESHAM'S

AUGMENTED VACUUM BRAKE SYSTEM



Photos by courtesy of The English Electric Co. Ltd., and Sudan Railways.

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15 Co-Co 1875 h.p. DIESEL ELECTRIC LOCOMOTIVES for SUDAN RAILWAYS...

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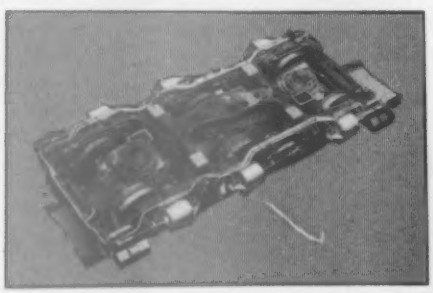

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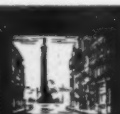

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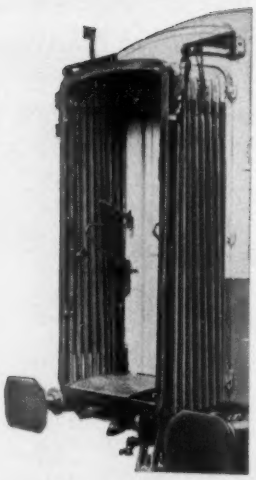
IN RECENT YEARS MANY JOURNEYS HAVE BEEN MADE SMOOTHER BY Mobil



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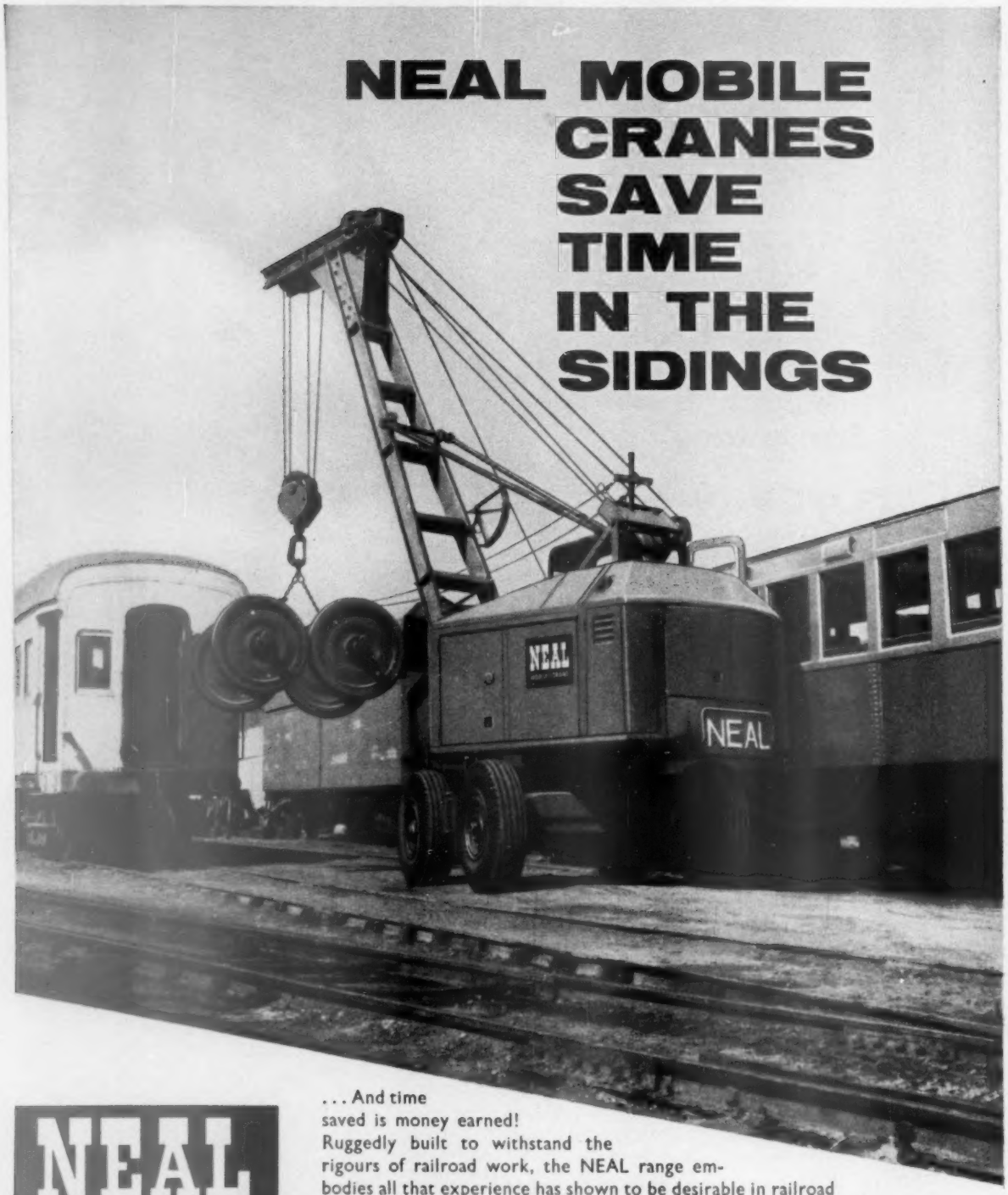

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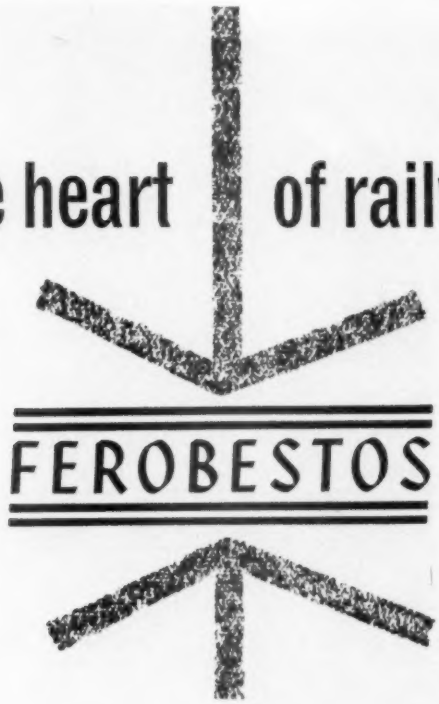

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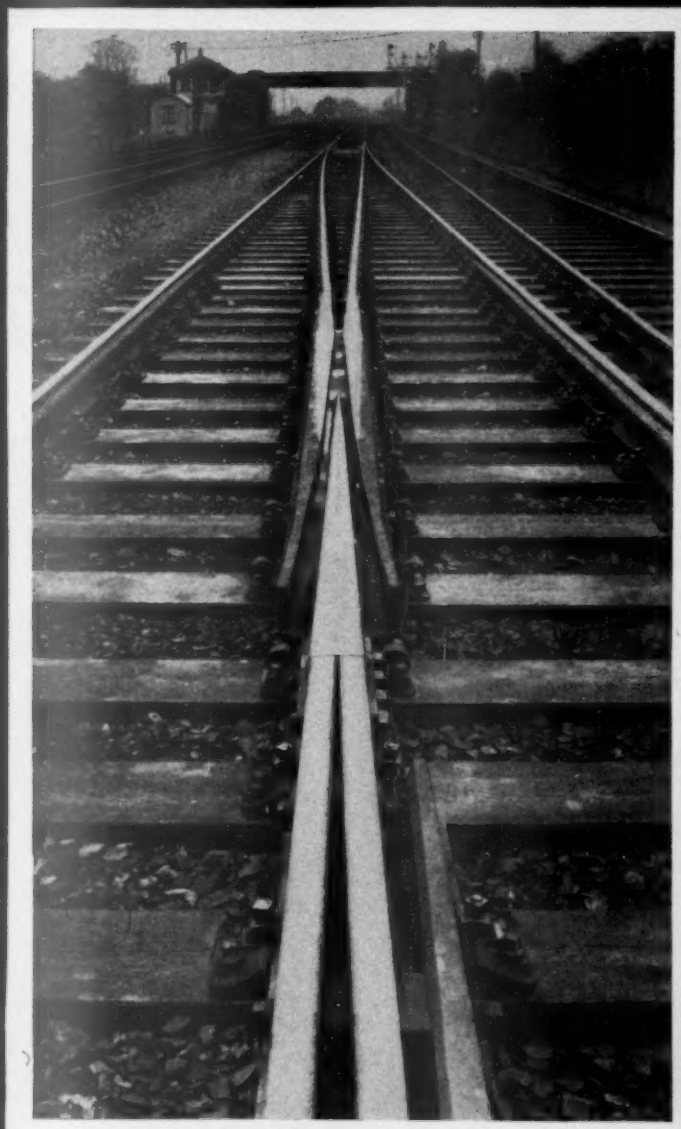
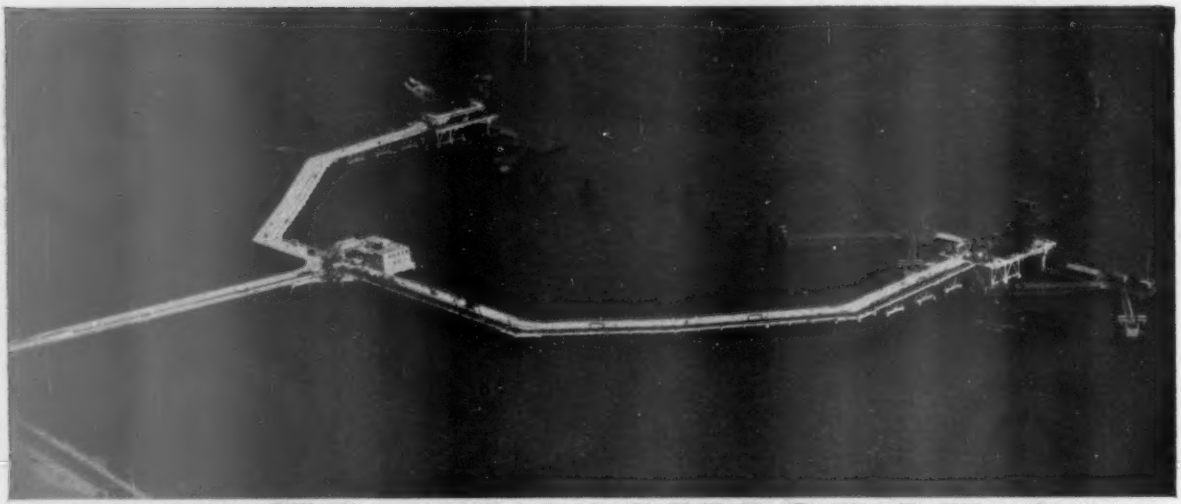


Photograph reproduced by courtesy of British Railways (Southern Region)

The accompanying illustration shows Solid Cast Monoblock Crossings of Hadfields Era High Manganese Steel, in situ at Worting Junction on the Southern Region of British Railways.

The Crossing angle 1 in 28, and approx. 25 ft. long, represents a new departure in the application of the cast monoblock type of Crossing, and are designed to carry heavy main line traffic at high speeds.

HADFIELDS
SHEFFIELD



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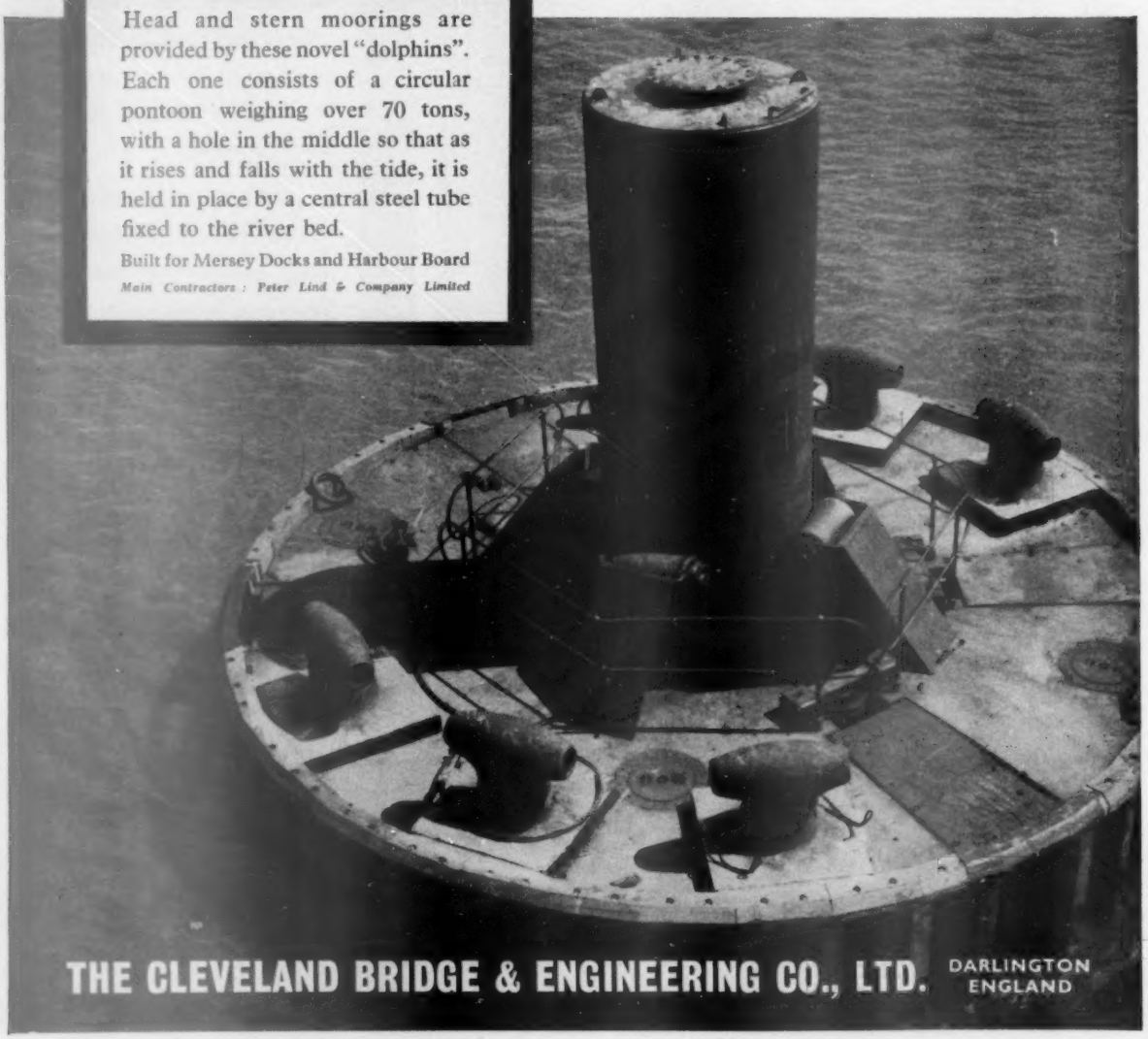
TRANMERE, LIVERPOOL

Head and stern moorings are provided by these novel "dolphins". Each one consists of a circular pontoon weighing over 70 tons, with a hole in the middle so that as it rises and falls with the tide, it is held in place by a central steel tube fixed to the river bed.

Built for Mersey Docks and Harbour Board

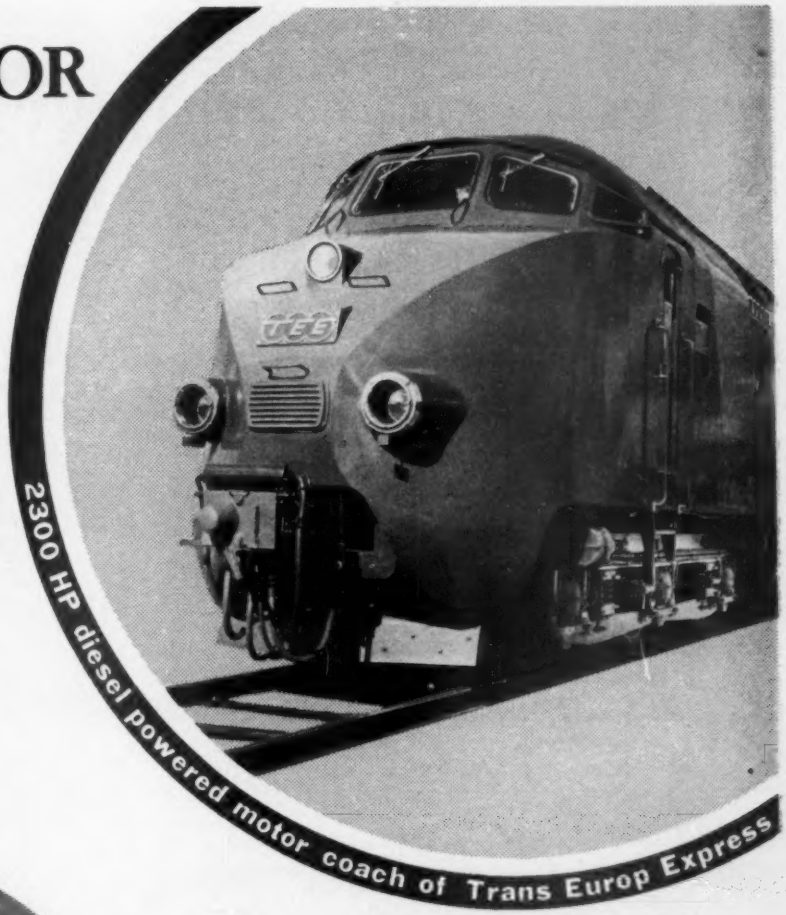
Main Contractors : Peter Lind & Company Limited

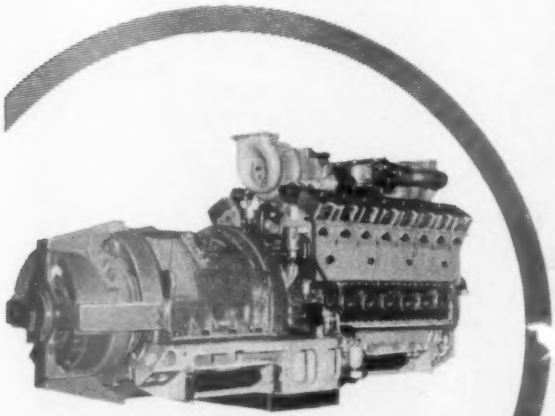


THE CLEVELAND BRIDGE & ENGINEERING CO., LTD. DARLINGTON ENGLAND

WERKSPOOR RUHB diesels less overhauling

The Werkspoor type RUHB 1616 diesel engine has been tested succesfully during 100 hours to the requirements of U.I.C. 623





One of the RUHB 1616 power units of 1,000 HP for Continental Europe's latest and most luxurious trains, the »Trans Europ Express«

Many users report that their Werkspoor RUHB and RUB high-speed diesel engines have covered 300,000 miles (8 - 10,000 running hours) before needing any overhaul. Frequently, these pre-overhaul distances and times have been greatly exceeded.

Here are some figures of measured wear after 10,000 hours of service.

Cylinder liners (chromium plated)
0·03 to 0·04 mm (0·0012 in. to 0·0016 in.)

Crankshaft bearings (copper lead)
0·02 to 0·03 mm (0·0008 in. to 0·0012 in.)

Crankshaft journals and pins (hardened)
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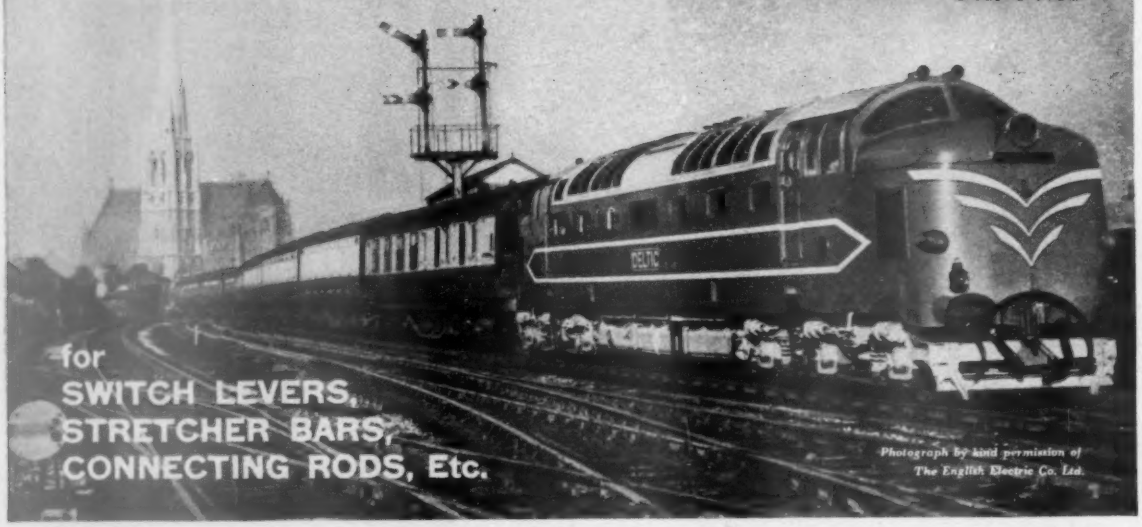

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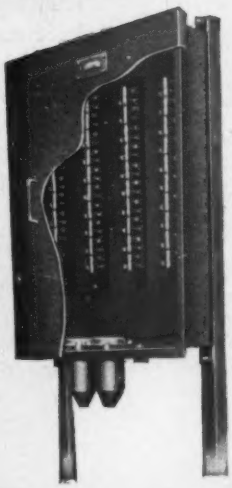

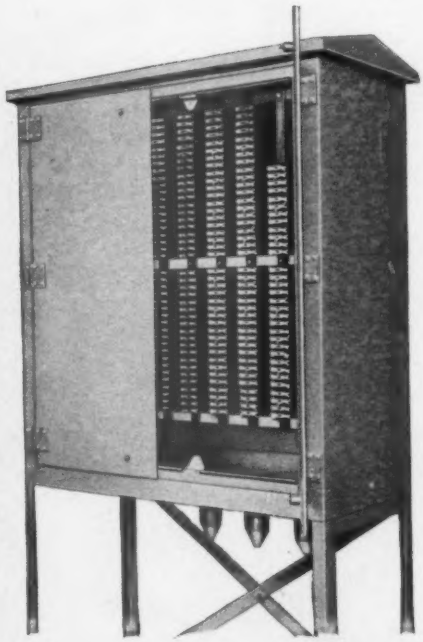

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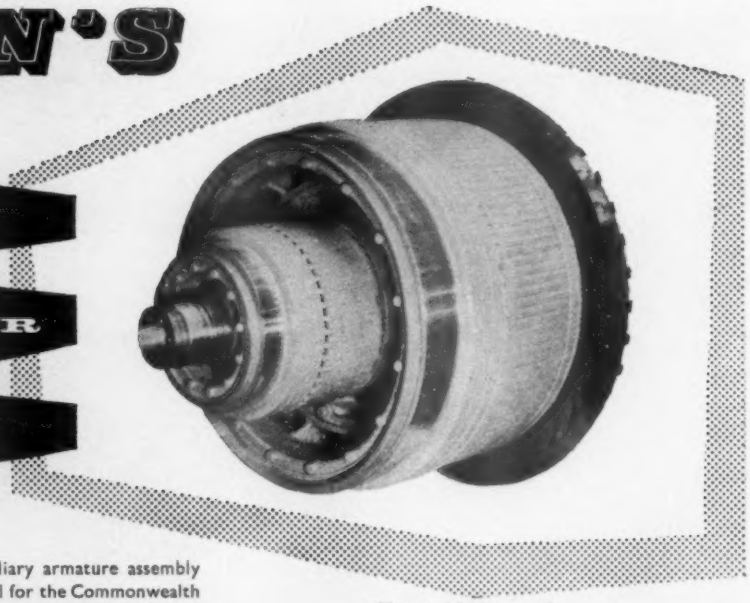

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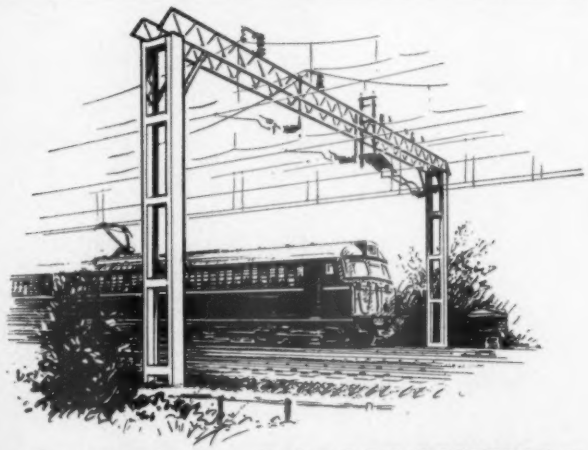

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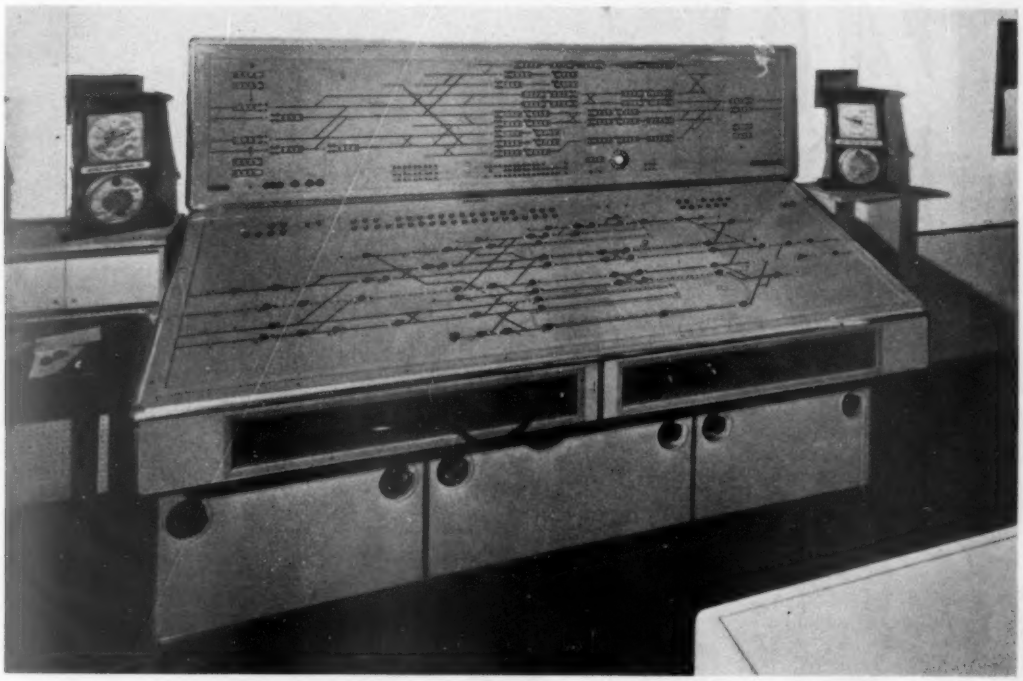

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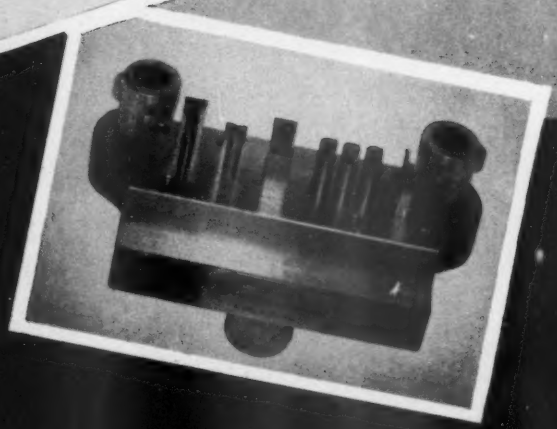

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A journal of Management, Engineering and Operation

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The White Paper debate

AT THE end of this month the Government will give time for a debate on the recent White Paper on the reorganisation of the nationalised transport undertakings. The number of questions which has already been tabled gives some indication of the very widespread concern which has been aroused by that document. This concern is by no means confined to the people actually engaged in the industry, although the impact of the proposals on them, necessarily, has been most acute. The British Transport Commission itself has given an undertaking that it will do its best to implement the proposals, including the giving of additional responsibility to persons who will have key posts in the new administration. That means, presumably, that Sir Brian Robertson and the other members of the Commission will continue in increasingly difficult circumstances to implement the wishes of the Ministry of Transport until such time as they can reasonably hand over to the new regime. Just when that will be must depend, in the ultimate, on the legislation which cannot become effective at the earliest until next year. Meantime, the new organisation will be brought into being in shadow form. One would have imagined that one way of getting the new Railways Board established, at least in embryo, would have been by basing it on the present British Railways Sub-commission. Whether that course will be taken appears, strangely, to be doubtful. At the present time it is understood that meetings are being held of advisers to the Minister of Transport, who have been formed into a committee, over which Sir James Dunnett, Permanent Secretary, usually presides, although Mr. Marples himself is the *ex officio* Chairman. These meetings, apparently, usually comprise Mr. K. W. C. Grand, and Mr. J. Ratter, who are members of the Commission and also of the British Railways Sub-commission, and Mr. D. R. Serpell, the Deputy Secretary of the Ministry of Transport, who deals, largely, with railways and who went to the Ministry from the Treasury some six months before the appointment of the Stedeford group in April last year. Another attendant at these meetings has been Mr. C. F. Kearton, Joint Managing Director of Courtaulds Limited, who was a member of the Stedeford group. Presumably, one must assume that this body, of which no public announcement has been made, is engaged in matters relating to the establishment of the new set-up which is to take shape under the White Paper proposals, but, in the absence of any direct information, its purpose, its progress, and its ultimate usefulness must be conjectural. So also, at this stage, must be the frequency with which it meets to tackle a problem which must, surely, merit constant and regular attention. How far the Minister will go in enlightening the country as to the Government's intentions in detail, and in filling in the very sketchy proposals of the White Paper when the whole question is debated at the end of the month, it is impossible to guess at this stage.

Work study for the transport user

ON FEBRUARY 7, the Harrow & Wembley Productivity Association is holding a one-day conference on the use of work study in transport in the Council Chamber of the Federation of British Industries, at 21, Tothill Street, London, S.W.1. The aim of the conference is to discuss the problems of the company with its own transport fleet, problems which include the need to preserve schedules and number of drops per vehicle against delays stemming from the ever-increasing volume of traffic on the roads. One of several techniques suitable for tackling these problems is the use of work study, and it is the purpose of the conference to discuss how application of this can improve operating efficiencies. Speakers under the chairmanship of Sir John Benstead, Deputy Chairman of the British Transport Commission, will include representatives of the British Productivity Council's Work Study team, industry, the B.T.C., and the Transport & General Workers' Union.

Nothing venture, nothing have

THE GRANTING of credits for purchasers of British products is of the utmost importance to our export trade. According to Mr. F. J. Erroll, Minister of State, Board of Trade, addressing the Stockport Luncheon Club last week, desire to avoid a credit race was a factor limiting the terms extended by the Export Credits Guarantee Department. In most cases, he

stated, E.C.G.D. policy was determined by general economic considerations rather than by misgivings as to underwriting. There was a limit to what credit Britain could give. Defending the work of the Department, he pointed out that at the beginning of last month the face value of E.C.G.D. "commercial" policies was over £1,000 million, against £367 million 10 years ago, and he stressed the difficulties of obtaining reliable information—in time—as to the credit being offered by competitors. Nevertheless, our competitors are helped in the export of locomotives and other railway equipment by extensive credit facilities afforded by their Governments. Some risks are worth taking. Orders for export are too important to lose through excessive caution.

Japanese achievements

THE LARGEST 3-ft. 6-in. gauge system in the world, the Japanese National Railways combines the characteristics of railways in highly industrialised with those of less-developed regions. It deals successfully with intensive goods and passenger traffics and with the consequences of typhoons and other natural phenomena. The standard of technical achievement is high, as shown in recent articles in this journal. Much has been done to overcome the disadvantage of the narrow gauge. In these respects the J.N.R. resembles the South African Railways. There has been useful pioneer work with a.c. traction over part of the extensive electrified mileage. The many orders placed with Japanese manufacturers for motive power and equipment of all kinds make the National Railways a useful proving ground and a source of continued work for home industry, with consequent ability to compete successfully in overseas markets. The J.N.R. management has been assiduous in issuing well-illustrated accounts, in good English, of its activities; two of these are the subject of notice on page 41.

Overseas railway traffics

EAST AFRICAN Railways & Harbours approximate railway revenue for the month of November, 1960, amounted to £1,616,000 as compared with £1,490,000 in November, 1959, an increase of £126,000. Goods traffic revenue increased by £111,000, passenger and other coaching revenue by £14,000, hotels and catering receipts by £1,000, and road services, livestock and miscellaneous earnings by a total of £4,000. Receipts from inland marine services fell by £3,000. Canadian Pacific Railway revenue for November amounted to $38,582,376 compared with $39,035,502 in November, 1959, a decrease of $453,126. Railway expenses amounted to $34,419,733 ($34,816,175) resulting in net earnings of $4,162,643 ($4,219,327). Aggregate net earning from January 1 to November 30 amounted to $29,568,908 compared with $31,578,191 in the corresponding period of 1959. Salvador Railway Company receipts for October, 1960, amounted to colones 132,000 compared with colones 125,000 in October, 1959, an increase of colones 7,000.

Courses for guards and ticket collectors

ENHANCED morale is reported to be a result of the current series of courses for guards and ticket collectors of Coras Iompair Eireann. The three-day courses are run by the company's Training Section at the C.I.E. Club in Dublin. Each affords talks and discussions on subjects such as the duties of guards and checkers, rules and regulations, effective speaking, smartness in appearance, relations with passengers, and dealing with emergencies. The number attending is limited; on a recent course it was 14. The atmosphere is reasonably, but not unduly, informal. Students need not wear uniform. Use is Made of films and other visual aids, and of tape recordings. The last, concerned with correct speech, have proved very helpful. Discussions elucidate points about which men have been worried. By next April it is expected that every guard and ticket collector will have attended. This effective form of instruction and help for its staff is one of the many ways in which C.I.E. is improving staff morale.

Satisfied customers

THE EFFICIENCY of British Railways export express service is shown by the satisfaction of 90 per cent of the users. Their views have been analysed in a survey by the Association of British Chambers of Commerce in conjunction with the British Transport Commission. The information was compiled from questionnaires returned early in 1960. Of the 1,300 exporters about 80 per cent were manufacturers and 16 per cent merchants. The manufacturers represented about 10 per cent of the national total, and the annual export tonnage of 2,500,000 covered by the sample was about 10 per cent of the total tonnage. Iron and steel accounted for 35 per cent of the total tonnage considered, of which 84 per cent went by rail. Coal and oil exports were not included. The export express service, introduced in November, 1956, gives an assured arrival next day for traffic in wagon-load quantities; it now covers 10 ports and nearly 330 inland centres. The ports it covers are those most used by exporters. Export traffic, the report states, has much in common with other freight traffic in Britain. Most heavy goods pass by rail but light finished products go mainly by road.

Motive power facilities at Le Mans

A NEW railcar depot and electric locomotive sidings are now in service at Le Mans on a site within the Pontlieu triangle, where the S.N.C.F. main line from Paris forks to serve Brest in one direction and Tours in the other. This position has operating advantages over the earlier site alongside the marshalling yard, being closer to Le Mans passenger station and reducing the number of movements over the busy section of the Brest-Tours main line approaching the yard, which carries also traffic to and from the Paris direction. The depot covers an area of 23,920 sq. yd., of which 1,914 sq. yd. is under cover. Three electric locomotive tracks, each 219 yd. long, are allocated respectively to stabling and inspection of freight locomotives, and express and mixed traffic locomotives, and to movements to and from a siding for locomotives under repair. Normally, the movement of locomotives through the depot follows a regular pattern, entering from the Tours line, reversing into one of the roads where inspections are carried out, and then moving forward from the pits to the departure section. If necessary, locomotives can leave by the entry line, the signalling having been arranged to allow this. The adjacent railcar depot deals with the stabling and inspection of rolling-stock for the Le Mans-Chartres service and includes a car shed with four roads, all equipped with pits, and illuminated by fluorescent lighting.

Automatic marshalling yards

THE efficient operation of railway freight traffic is primarily governed by the marshalling yard. Its design and method of working has received considerable attention since the end of the last century when sorting sidings were laid out on the gravity principle. The first step was the use of gravitation with hand worked points, wagon movement being controlled by brakesmen applying hand brakes or skids, a method accompanied with considerable risk to personnel. Gradual progression led to power worked points controlled from a central cabin and later to the use of retarders to dispense with the dangerous braking practice.

The evaluation of the present-day mechanised and fully automatic marshalling yard was explained in a paper entitled "Automatic marshalling yards," by J. C. Kubale (Member), read before the meeting of the Institution of Railway Signal Engineers held in London on January 11. Mr. Kubale ex-

plains in the introduction to his paper that the portion of the marshalling yard concerned with the resorting of a train is the reception lines, where the wagons are placed on entering the yard, the portion of track where they are moved down an incline, and then the sorting of marshalling sidings for re-forming into new trains. After certain preliminary work such as uncoupling, preparation of cut lists and so on, a train is slowly propelled from the reception yard to the summit of the incline down which single wagons or groups of wagons (or "cuts") travel through points and retarders towards the end of the track space available in the marshalling or sorting siding. During this movement a wagon passes through several track points and retarders, the latter regulating the wagon speed in relation to other cuts, to reduce the possibility of overtaking and also to ensure that it arrives at its designation at the proper buffing speed. The vertical height from the summit of the incline to the end of the marshalling sidings is connected by a series of gradients so arranged that an initial steep gradient enables wagons to separate and subsequently maintain sufficient space separation between following cuts to allow points to be moved, retarders to be effective and correct routing of wagons to be obtained.

Centralised operation of points leading to the marshalling sidings, with track circuit protection, has been in use for many years, some examples being Banbury, Rogerstone, Mottram and Severn Tunnel. Retarders were installed in the point area principally to absorb the excess energy of wagons having a low rolling resistance and to release all wagons into their respective sidings with a velocity which allowed them to reach their destination at a safe buffing speed. In the majority of mechanised yards retarders are manually controlled by an operator, from a centrally situated control tower. He has to form his own judgment, from observation of each wagon, and the distance it has to run, as to the degree of retardation necessary. Wagon chasers are necessary to correct errors when wagons are insufficiently retarded. The efficiency of a yard operated in this manner naturally varies with the individual skill of operators and it would be unreasonable to expect a very high degree of accuracy from even the best.

It has been appreciated that these difficulties can be overcome by the application of automatic control of humping operations and this advance has been the subject of research and experiment for some time. Automatic operation can now be applied and may be partial or complete. The author explains that the yards on British Railways employing automatic operation are, in the order of their completion, Thornton Yard, Scottish Region; Temple Mills Yard, Eastern Region; and Margam Yard, Western Region. All of these yards have automatic point operation. Thornton Yard employs automatic operation of primary and secondary retarders according to preset release speeds manually selected by the retarder operator. Temple Mills has automatic control of the primary retarders, the secondary retarders being manually controlled. Margam Yard has automatic control of all retarders and is the only one that is fully automatic. Mr. Kubale concludes with a full description of the various operations in a fully automatic yard and the techniques employed.

Railway modernisation conference

AN account of what engineers have achieved in the vast modernisation programme of British Railways will be given at the "Railway Modernisation Conference" in London on May 3-4 next. This conference is being organised jointly by the three major British engineering institutions—the Institutions of Civil, Mechanical, and Electrical Engineers. It is being held at the Institution of Civil Engineers. Railway engineers from all over the world have been invited to attend.

Five papers will be presented, specifically: "The engineering aspects of the modernisation plan for British Railways," by R. C. Bond, Technical Adviser to the British Transport Commission; "The contribution of civil engineering to the British Railways modernisation plan," by M. G. R. Smith, Chief Civil Engineer, Western Region, British Railways; "The impact of mechanical engineering on the British Railways modernisation plan," by J. F. Harrison, Chief Mechanical Engineer, British Railways Central Staff; "Electric traction in the British Railways modernisation plan," by S. B. Warder, Chief Electrical Engineer, British Railways Central Staff, and "British Railways modernisation—signal engineering and telecommunications," by J. F. H. Tyler, Chief Signal & Telecommunications Engineer, Southern Region, British Railways.

The organisation and announcement of this conference at this particular juncture, when there is so much uncertainty about the future of British Railways as a whole, and as to its continued modernisation in detail, is a most welcome development and one which will carry the greatest interest for engineers in all parts of this country and abroad. Not least interesting is the choice of subjects for discussion and of the authors of the papers to be presented. The conference will allow some of those responsible for major decisions regarding modernisation to present detailed accounts of progress made in recent months to an audience qualified to assess the worth of that achievement and to pass judgment on the necessity for its instigation; it will also enable frank discussion to take place on the merits of the methods used and informed speculation to be made concerning measures which might valuably be taken in cases where further improvement might appear to be of advantage.

A very significant aspect of the conference as a whole undoubtedly will emerge: the extent to which all the varied facets of the engineering world are welded together in the expression of the modernisation now taking place throughout British Railways. Much has rightly been heard in recent weeks of the loss which would be suffered by the electrical supply industry if any halt were to be made in the progress of electrification under the plan: not so much publicity has been accorded to the possible plight of locomotive, and rolling-stock, building industries in the same circumstances. It is at least likely that the invited guests will include representatives of overseas railway systems, and perhaps of industries serving those systems which already have had to curtail their modernisation plans either as a direct result of government ukase or as a result of their own financial shortcomings: no doubt our own Government, which we know follows reports of this kind with keen attention, will be interested to learn of any effects which such curtailment may have had on the transport and general economy of the country concerned.

Loading of light rails

COMPARED with those lightly used lines of Britain and other European countries, for the maintenance of which part-worn rails of more than ample strength can be passed on after use on intensely worked main lines, most oversea single-line tracks of railways which carry relatively small annual tonnages have to be built initially with rail sections of minimum weight and cost which comply with safety standards. Loading problems arising from this fact and from the constant tendency towards increasing axleloads for motive power and other rolling stock, are summarised in a paper by Mr. James McFarlane Kesson, Assistant Chief Engineer, East African Railways & Harbours, Nairobi, presented at a meeting in London earlier this week of the Institution of Civil Engineers. The author describes cases of known damage to rails and sleepers caused by excessive loading and reviews some investigations which have been carried out into the problem. He asks whether the production of rails for export, to the latest British Standard sections (the B.S."A." series), are not overdue and suggests that still further attention to rail design is needed to ensure that the maximum loading benefit is obtained. The general research work required is beyond the resources of the smaller individual railway systems. Also it would appear that there is a need for establishing the maximum loading and

best arrangement of locomotive axles for any given weight of rail.

One of the conclusions reached by Mr. Kesson is that use of the continuous elastic-support theory as a means of assessing the safe loads and stresses caused on the track by locomotives is useful in designing the axleloading and layout, but with heavy axleloads the curve effects on rail-fillet stresses become the critical factor. With smaller wheel diameters the local rail-head stressing effects must also be watched. An interesting comparison is made between the rail deflection and stress diagrams for the 59 Class Beyer-Garratt steam locomotive as it was originally proposed with a maximum " flat " axleload of 17·5 tons and, as delivered, with "taper" axleloading for use on 80-lb. track. With the uniform axleloading the leading bogie wheels would have induced a stress as great as 11·149 tons per sq. in. compared with about 6·5 or 7 tons for the driving wheels. With the taper axleloading no rail stresses exceed 8·753 tons per sq. in. at 45 m.p.h. on 80-lb. B.S.R. track. At the same time adhesive weight is increased by 13·6 per cent to the advantage of tractive ability. Tests with strain gauges fitted to 80-lb. B.S.S. rails, where fatigue failures have occurred on curves at the foot of the web at the junction with the lower fillet, have shown that the effects of the 59 Class locomotive are more severe than those of previous lighter designs used on the East African system. Also the worst effects are obtained with locomotives travelling at the permitted speed or faster. Therefore, from a purely engineering viewpoint it seems clear that these locomotives should not be run in service on the light track. Arrangements have been made to use a rail-crack detector of the frequency-modulation type.

In ordering 10 1,800 h.p. diesel-electric locomotives for main-line use on East Africa Railways it was decided that initially, for use on 60-lb. track, the maximum axleload should be restricted to 13 tons (or 13½ tons with taper axleloading); a maximum P/D ratio of 5 should be applied as recommended by British Railways Research Department; a 1-Co-Co-1 wheel arrangement should be used to obtain to some extent the cushioning and rail-stress relief effect of a light non-power-driven leading axle to the leading bogie; and that the method of bogie inter-connection should provide as much guidance as possible between the leading and trailing bogies. Depending on results in service, particularly the comparative wear and fatigue effects on curves, it will be decided whether to allow these locomotives to operate on tracks which are lighter than 60 lb. per yd. or whether an additional type of main-line diesel locomotive will be required to cover the several hundred miles of 50-60-lb. track which will remain in use for many years.

In dealing with rail-section design improvements, Mr. Kesson summarises the features which he believes to be desirable in modern practice and which have been incorporated in the B.S. "A" series of flat-bottom rails. Briefly these are: liberal bottom fillet radii, compound top fillet radii, radial faces to the web, equal fishing angles at the top and bottom of about 1: 2·75, height greater than flange width, and attention to the top flange radius.

The art of organisation

SPEAKING before the Institute of Transport on Monday last, January 9, Mr. H. C. Johnson, General Manager of the Eastern Region of British Railways and Vice-President of the Institute of Transport, had this to say about organisation in general: no manager with heavy responsibilities should deal directly and regularly with more than about half-a-dozen people; he should not be concerned with detail considerations. About railway organisation in particular, Mr. Johnson believed that this could not be organised exactly like either a Government department or manufacturing industry—it was unique. Some central direction was desirable but, as the staff often worked in small groups remote from central supervision, it must exercise a high degree of local initiative.

The important changes which were about to take place throughout British Railways were now known in their broad outline. The changes, in their initial stages at least, would probably have their greatest effect at high levels, but their ultimate impact might well be vital to all railwaymen. Publicity given to railway affairs inevitably would cause some doubt and uncertainty throughout the industry, and an important task of management would be to encourage the rank and file to carry on confidently with its daily work. This was not the first upheaval of its kind. Accepting the provision that it might be necessary, it was nonetheless profoundly disturbing: the wind of change certainly was blowing hard—it was to be hoped that the wind was in the right quarter.

As long ago as 1933 the L.N.E.R., under its then Chairman Mr. W. Whitelaw, had stated its belief in the value of decentralisation and in the delegation of effective authority to the man on the spot. This policy now was a feature of current thinking which, until nationalisation, had tended to favour units of increasing size. Authority and direction should be applied at the level which best produced results: the aim should be the maximum degree of decentralisation consistent with the overall policy. Formerly, it had not been uncommon for up to 18 departmental officers to report and be directly answerable to a railway General Manager. He, with his Assistant, had been responsible for dealing with their problems, for co-ordinating their views, formulating policy, and answering those in authority over him. In the somewhat easier circumstances of former days, his task had been extremely difficult. In present conditions, such a task would be impossible, and no single person could measure up to it.

On the Eastern Region, there were three Assistant General Managers, each with a separate sphere of interest and each forming a part of the management team under the General Manager, though not forming a separate level. There also was an Assistant for general administration whose responsibility it was to effect general co-ordination within the management sphere. He also was Secretary of the weekly general management conference at which the Assistant General Managers spoke in a corporate capacity and expressed views on all subjects affecting management as a whole. In this way a small management team worked closely together, each member acting on behalf of the General Manager, who gave direction and took decisions where required.

Mr. Johnson believed that individuals at each level should be encouraged to discuss and settle differences and to appeal to a higher level only when those difficulties could not be resolved. This kind of collaboration was good for the education, and widened appreciation of the problems at issue. Special problems arising within the field of management should not too often be tackled by the appointment of *ad hoc* committees (sometimes called working parties). A former Assistant General Manager of the L.N.E.R. believed on this subject that if an organisation was created it should function, and the people comprising it then could be held responsible for results. If the organisation could not cope with a situation there was something wrong with the organisation and the sooner it was altered, the better.

Delegation of authority was advocated by many, but practised by few. Delegation of authority must be accompanied by delegation of power to take decisions at that particular level. There must be a clear definition of functions, powers, and responsibilities. An example of effective delegation in the Eastern Region was provided by the new traffic organisation. Formerly, traffic matters at each level had been shared between the commercial, operating, and motive power departments. This arrangement had provided an alibi for everything. Under the new organisation there were three lines and seven districts. Each line and district manager was responsible for traffic matters within his jurisdiction. Responsibilities at line and district level were clearly defined. Only major policy now was referred to general management.

After delegation, people must keep to their levels—they must not question or interfere lower down the chain of command,

a practice which destroyed morale and general efficiency. If the terms of reference were clear, the answers required on each problem should be capable of a clear reply. Failing this, the individual concerned should be dealt with in the appropriate fashion: the job should not be done for him. Effective control and provision of information and statistics must enable performance to be assessed by management. In the past, many departmental officers had been responsible for the use and maintenance of assets worth many millions of pounds. They had not really known the cost and the takings of the services they had provided, and charges had been fixed without any real regard to the cost of those services. The increased regional autonomy now proposed was to be accompanied by increased accountability and the provision of some sort of trading account. Line managers and traffic managers would be held accountable for results of services, and Mr. Johnson pointed out that accountability was an essential corollary to delegation of authority.

Despite their size, the railways offered great scope and opportunities for the exercise of initiative to the individual—many people worked in small units or alone, with very considerable responsibilities. Completely centralised, the organisation would break down. Equally, decentralisation carried too far would produce an inefficient overall service. The staff comprised specialists and it was most difficult to imbue the specialist with the team spirit and to convince him of his proper place in the organisation. He must be kept as near as possible to management, and as much cross-fertilisation of skills must be effected as was practicable. Those responsible for technical matters must also understand the problems confronting management and traffic so that their thought was not dominated by technical considerations. There should be greater interchange of staff: those with an engineering background should be allowed to enter traffic and management fields. This cross-fertilisation would help to bring together user and designer and allocate their respective roles and responsibilities in the design and production of equipment. The engineer should not be allowed to make the final decision on design, style, or price: he should only advise from his specialised knowledge. Although there should be inter-departmental and inter-regional consultation on design, two evils should be guarded against—design by committee and delay.

It should be the constant aim of management at each level to make known to all members of the staff the policy which was being followed, and the means by which it was hoped to achieve it. This should be done by personal contact rather than by the written word. Mr. Johnson was of the opinion that few people bothered to read these days.

Elias report on Nigerian Railways

THE Nigerian Government in 1960 appointed the Elias Commission to inquire into the economics, administration, and industrial relations of the Nigerian Railway Corporation. At that time, despite the excellent results achieved by the Nigerian Railway Corporation in the year ended March 31, 1959, there was concern over intensification of road competition. The members were: Dr. T. O. Elias (Chairman), then Nigerian Research Fellow at the Commonwealth Studies Institute at Oxford, and now Federal Attorney-General & Minister of Justice; Sir Arthur Kirby, Commissioner for East Africa in London and former General Manager of East African Railways & Harbours, and Dr. P. N. C. Okigbo, Economic Adviser to the Eastern Regional Government in Nigeria. The Commission arrived in Nigeria on May 16, and remained until June 14. The report recently published by the Nigerian Government is dated August 10, 1960. Many people will consider it a disappointing document, unlikely to help the Corporation to achieve greater efficiency.

As to the economics, the Commission has not stated succinctly whether these are sound or not. It has pin-pointed various matters on which it makes recommendations; but these are unlikely to have much effect on the financial situation of the railway. A good deal of time was spent on examining allegations by the Nigerian Union of Railwaymen and others of extravagance. Regarding the economics of traffic operation, the conclusion is that conditions in Nigeria are not difficult and that traffic flows favour the fairly low operating costs. Even so, it is stated, costs per route-mile in Nigeria are very much higher than in East Africa and the Sudan; andit is suggested that this may be due to "heavy staff overheads and extravagant accounting and documentary procedures.

While approving in principle of the introduction of diesel traction, the Commission remarks that it was "unfortunate" that steam locomotives already were on order before the first diesel units were acquired to deal with the back-log of traffic in 1954-55. Because traffic has fallen below expectations, it is stated, there is a surplus of steam motive power and of coal stocks and the "excessive stabling of steam locomotives has also had a bad effect upon staff morale." The economics of diesel working are not discussed. The choice of diesel-hydraulic as against diesel-electric locomotives is supported by the Commission.

Regarding the administration, the Commission proposes that an "All-Nigeria Transport Authority" be set up by the Federal Government. This would include representatives of the Railway Corporation, the Federal and Regional Governments, the Ports Authority, the Nigerian Road Federation; the more important road transport operators, certain large organisations commercial users of the railway, and "similar interested parties." This body would be a central agency for co-ordinating policy as to rates and licensing of vehicles. It is suggested that it be as far as possible independent of Government control. Various detailed recommendations are made, in which most weight is given to allocation of senior posts to Nigerians with requisite qualifications, without experience. The report makes the suggestion that a suitably qualified Nigerian should be the second Chairman of the Corporation, in succession to Sir Ralf Emerson, "as soon as conveniently may be," and that the posts of General Manager and of Secretary of the Corporation be held by Nigerians subject to a period of 18 months' probationary training.

As to industrial relations, the Commission breaks new ground in treating relations between the railway and the public as falling under this head, for the term is considered usually to mean relations between management, staff and workers. The Commission states that management is "out of touch with the realities of the economic situation in contemporary Nigeria"; but it is clear from the list of witnesses and memoranda submitted that no authoritative commercial body, such as any of the chambers of commerce, or the Shipping Conference, or important traders such as the United Africa Company either gave evidence or submitted memoranda. It would appear that the Commission's opinion is founded largely on allegations by a few dissatisfied traders of comparatively small calibre, and the railway trades unions. In considering industrial relations proper, the Commission is on much firmer ground. It is clear that it rejects many of the unions' claims, whilst the chapter headed "Towards industrial peace in the railway" contains some very sound thinking, apart from the sentence (which would appear to have been incorrectly reproduced) in which the report implies that the unions will "soon assume full responsibility for the running of their great national asset."

Many allegations detrimental to the railway, and indeed to individuals, are reproduced in the report without any statement by the Commission as to whether it accepts or rejects them. This can result only in readers being left with a bad impression, not only of the railway administration, but also of the members of the Commission.

Two opinions are expressed of interest to railways in many countries. The Commission states that "experience elsewhere

has shown the unwisdom of the General Manager of a railway succeeding to the Chairmanship. . . ." It would be interesting to hear of specific instances in support of this. The practice in India has always been, and still is, to promote a General Manager to be Chairman of the Railway Board (formerly Chief Commissioner of Railways), and it cannot be said to have been unwise in that country. It is suggested that a Nigerian officer can be specially trained in 18 months to enable him to discharge efficiently the duties of the General Manager, and, in the same context, the suggestion that senior appointments of Nigerians can be made just because a man is a Nigerian, " as quickly as the exigencies of the service permit," without having regard to experience, qualifications, and character. The Europeans in the Indian railway system had some 20 years in which to train Indian officers to responsible posts. In Nigeria it does not seem that any urgent steps were taken to train Nigerians for officer grade posts until after Sir Ralf Emerson arrived in 1953.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

THE FUTURE OF RAILWAYS

January 6

SIR, I read with interest the letter from Mr. M. J. Douglas, published in your January 6 issue. There is one question, however, which has never been answered. It is :—" What happens to railway passengers and freight *during* the period of conversion of railways into roads ? " Would the Railway Conversion League please comment.

Incidentally, what sort of surgeon is it who operates with the intention of killing his patient. I suggest the League be re-titled, " The Railway Euthanasia Society." It would be more to the point.

Yours faithfully,

T. A. GERMAINE

19, Granville Road,
Sevenoaks, Kent

MELBOURNE-SYDNEY EXPRESS SERVICES

December 31

SIR, I would hesitate to trespass further on your space on the above matter only that there is such a close parallel between what is happening here and what is taking place in the South Eastern corner of Australia. In both places modernisation plans are being hamstrung by intolerable capital charges and inadequate motive power.

From Melbourne the line is double for 70 miles then worked by automatically changed electric staff for the remaining 120. There are no large centres of population, no heavy industries, nothing to feed the line but the Interstate traffic and what little the local wheat and wool farmers can produce. There are, as your correspondent, Mr. Bowles, points out in your December 30 issue, several branch lines some of which could probably be scrapped without much loss, but three of which run to the border to meet similar tentacles of the N.S.W. 4 ft. 8½ in. system, each with its own absurd break of gauge.

When the first concrete plan was announced I wrote to the Federal Member whose energy had started the ball rolling and pointed out the economic absurdity of the proposals. I stressed that there was no likelihood of an increase in the number of trains to be worked and that, therefore, duplication of the existing facilities could not be justified, that the cost of moving the rails and adjusting switches and crossings would be negligible and that the entire single-line section, plus branches, plus one of the double lines could, with a modicum of advance planning, be converted to take standard stock probably over a weekend, and that there was no apparent reason why N.S.W. stock could not have been running into Melbourne in a matter of six months or so.

I received the rather astounding reply that not even under wartime conditions had it been possible to persuade the Victorian authorities to change the gauge of a mile of their track. So in the near future the very heavy existing track will drop back to the status of a long and very costly branch while the new and equally costly line carries traffic well below its capacity.

On motive power, while we have the assurance from Mr. Bowles that the local Administration keeps abreast of all modern developments, it is perfectly clear that in this case they have done no more than ask their normal supplier for another dose of the mixture as before, but with a bit more urge if possible, and it is unfortunate that U.S. equipment lags so far behind the rest of the world in producing power for a given weight. Hence we find this new service with no greater horse power than was available from its steam stock of 25 years ago, a handicap almost as great as that presented by high capital charges.

Yours faithfully,

L. IRVINE-BROWN

Ivydene, Tilston,
Malpas, Cheshire

BRITISH RAILWAYS SERVICES

December 22

SIR,—I found myself in general agreement with much of Mr. Taylor's long letter in your issue of December 16, 1960. Staunch supporter of rail travel that I am, I realise many stations and lines must close. I very much deprecate the practice of whittling the train service away before the closing of a line. Except in very rural locations any service of less than about eight trains a day must be uneconomic and doomed sooner or later, and of little value to the travelling public. A rather more frequent service on some local lines on Eastern and London Midland Regions in particular may lead to less bad running.

For instance, a local service at a place like Nottingham may be held for well over an hour because some express from Scotland is running late, so the local passenger just does not use such a service, whereas if the service was a bit more frequent such a delay may no longer be needed, for the long distance train will make a reasonable connection with an alternative service.

Bad services in the Midlands and North have caused people to get out of the habit of travelling by rail. How else can one account for stations like Oakley, Micheldever or Sutton Bingham remaining open on Southern main lines while more important stations like Weedon, Blisworth, Arlesley Essendine, etc., on London Midland or Eastern main lines are denied a service ?

In the same vein, why should the Guildford to Horsham or Horsham to Brighton lines survive quite cheerfully, yet apparently there is no traffic potential for a Leicester-Market Harborough-Northampton service or Consett to Newcastle-on-Tyne?

As I have said in your columns before, I think it is wrong too that major alterations to a time should be made at any time other than when a new timetable is produced.

Yours faithfully,

J. B. LATHAM

Channings, Kettlewell Hill,
Woking, Surrey

The Scrap Heap

Something stronger

It is reported that the following announcement was printed on the 3s. 6d. afternoon tea menu in the dining car of a British Railways, Southern Region, express train recently: " May we draw your attention to the interesting wines now provided at prices as reasonable as any you will find in this country."

Nice sense of occasion

A woman recently gave birth to a baby on a L.T.E. bus as it was passing St. George's Hospital at Hyde Park Corner. A doctor and nurses from the hospital attended her and the baby, which weighed 6 lb. 14 oz.

" Transport per pood per verst "

According to German reports, says *Commercial Intelligence*, negotiations are now pending between the Russian railroads and the Prussian Governmental railroads to carry into execution a project of the Russian Minister of Finance which aims to obtain for Russian petroleum lower transportation charges on Prussian railroads. The Russian roads offer to carry the oil at the ridiculously low rate of 1/100 of a kopeck (half a cent) per pood (36¼ lbs.) per verst (two-thirds of a mile).—*From " The Financial Times " of December* 22, 1900.

Top people topped

The sad news that the Orient Express is to be axed for reasons of economy, although not unexpected, comes as a bitter blow to veteran travellers on this famous old train, especially those who recall the glories of its pre-1914 heyday. . . . To be assassinated on the Orient Express used to be the prerogative of high officials in the service of Franz-Josef and an admirable way of rounding off a distinguished career. . . . The uncertainty of the political situation in the Balkans accounted for many of the more romantic incidents on the Express. . . . One could talk of a decapitated Turkish politician discovered still holding in his hand an unspilled cup of black coffee. . . .—*Reproduced by permission of "Punch."*

Buffer state

After visiting a cinema, two boys, aged 10 and 12 respectively, went to a goods yard and climbed on the buffers of a wagon. They said later that they had previously been able to jump clear near their homes. This time, the train picked up speed and they were carried through the town, and through a tunnel. One of them said: " If we don't jump now, we'll be in New York," so they jumped. Although injured, the boys managed to reach a police station five miles from their starting point.

Train service announcement

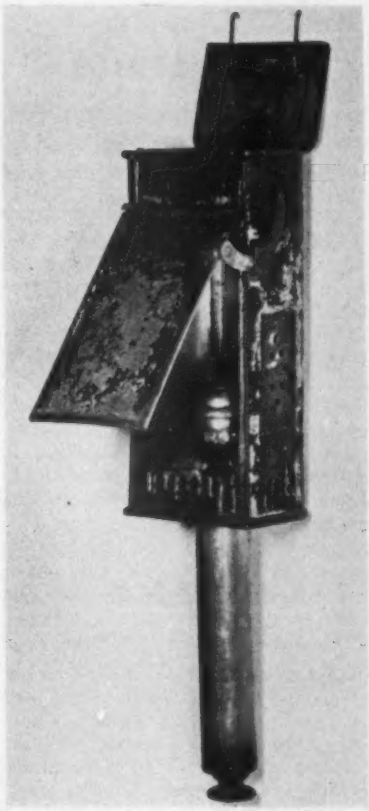
In some village churches in 19th-century East Anglia . . . it was the waker-up's job to keep an eye on the congregation, and, if someone's head started to nod, to sidle quietly along the aisle and tap him on the shoulder with his long cane. In a church in the Stowmarket area the waker-up once . . . noticed a man whose chin was on his chest, and it was plain that he was miles away from the sermon. The waker-up leaned over and gently tapped him on the shoulder. The effect was immediate. The man was a porter at the nearby station; and as soon as he felt the touch on his shoulder he shot up like a rocket and bawled at the top of his voice: " Haughley ! Haughley ! " and then proceeded to rattle off the names of all the stations to Norwich.—*G. E. Evans in a B.B.C. broadcast.*

Candlelight for trains

Until the early years of this century, the general standard of train lighting was feeble. One hundred years ago public requests were being made for every carriage to be provided with some form of light at night, but, although illumination became general, it was usually in the form of an oil lamp, dropped into position through a hole in the roof. There was a transition from oil to gas in the 1880s and early 1890s.

COMMEMORATIVE STAMP

Stamp commemorating 125 *years of German Railways*



Candleholder, showing metal cylinder and folding hooks on lid

The gas was burned in flat flame burners which gave sufficient light to assist entry and exit, but not for reading. If a passenger wished to read, he provided himself with a candle, and many ingenious metal holders were on sale. We were shown recently by Dr. A. P. Thurston, a Past President of the Newcomen Society, the candleholder illustrated. The candle is spring loaded in a movable metal cylinder, to keep the flame constant in a desired position, and its light is directed by an adjustable shield. The device could be attached to the upholstery by folding hooks, two of which may be seen on the lid. The side compartment with perforated sliding shutter contained matches. Such candleholders were still in general use by regular suburban travellers on some railways in the 1890s, and survived into the first decade of the present century. The use of incandescent gas lighting and the spread of electric lighting rendered them obsolete well within living memory.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

SOUTH AFRICA

Conveyor system for Windhoek

Two electrically driven drag-chain type conveyor systems, the first of their kind to be used by the South African Railways, are being installed at a cost of £27,000 in the new goods sheds at Windhoek. The new conveyor system consists of chains moving in troughs in platforms. The two chains are 1,723 and 578 ft. long and between them serve three platforms. By hitching four-wheel trailers, of which there are 150 of 2,000-lb. capacity, to the chains at 18 ft. intervals, and unhitching them again at whichever point they are required, a continuous motive force is available without the use of platform haulers, thus providing a more efficient service requiring fewer staff.

RHODESIA

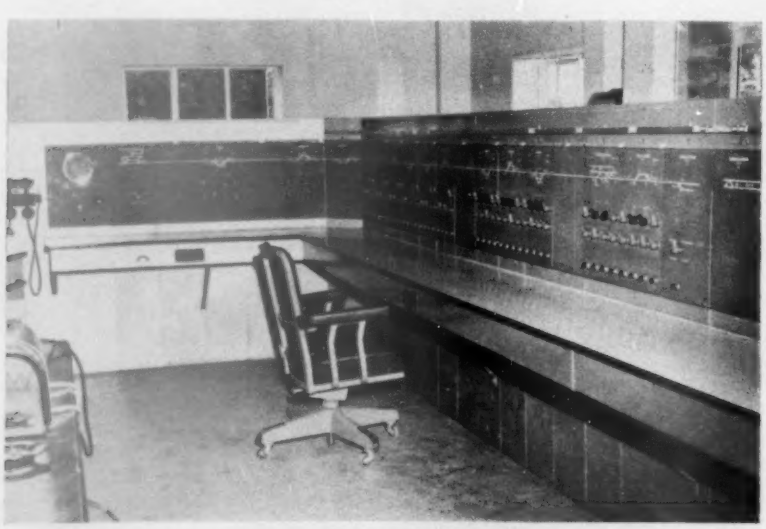
C.T.C. progress

Rapid progress is being made with the introduction of C.T.C. on the North and East lines of Rhodesia Railways, and during December the entire section from Bulawayo (Mpopoma) to Livingstone was brought into operation with the opening of the Thomson Junction-Matetsi section. The 301-mile section from Bulawayo to Livingstone is one of the longest operated under C.T.C. arrangements in the world. Work is also progressing on the Bulawayo-Salisbury line where, at the end of November, the Makwiro-Gatooma section of 49 miles was opened. The 45-mile section between Salisbury (Lochinvar) and Makwiro has been in operation since July. This development means that the entire line from Lochinvar to Gatooma (94 miles) is now operated under C.T.C. The section from Heany (near Bulawayo) to Gwelo, a distance of 93 miles, was the original C.T.C. section on Rhodesia Railways and has been operating for some years.

NIGERIA

Maiduguri extension progress

Mr. R. A. Njoku, the Federal Minister of Transport & Aviation, during a recent inspection tour of the first 60 miles of the proposed railway extension from Kuru to Maiduguri, is reported to have said that the Bornu railway extension was an important transport development project which was bound to strengthen the links between the diverse peoples of north-east and southern Nigeria. The 400 miles of track being laid into Bornu will open up a large area of healthy farming country and stimulate a steady flow of export produce in cotton, groundnuts, corn, cattle and thousands of tons of fish annually from the Chad District to the south. It is expected that Bauchi (107 miles), the proposed headquarters of the extension, will be reached in April. The whole project is estimated to cost £20·4 million.



C.T.C. panel at Livingstone supplied by Associated Electrical Industries-G.R.S. Limited

INDIA

Fast goods service to Assam

A daily "quick transit service" (Q.T.S.) has been introduced by the Eastern, North Eastern, and North-East Frontier Railways, between Howrah (Calcutta) and additional stations in North East Assam. The transit time varies between eight and 16 days. The journey involves transhipment from broad to metre gauge, and two wagon ferries.

Catering services

Provision of refreshment facilities at further stations and in some restaurant cars working in expresses of the Central Railway, including the "Deccan Queen" (Bombay-Poona) were taken over recently by the Catering Department from contractors. The Department is expected to show a small profit for the year 1959-60.

Refrigerated fish van

The Central Railway works at Matunga (Bombay) recently completed a refrigerated fish van, the first of its type to be built there. Improved refrigeration techniques have resulted in a considerable growth of fish traffic from the Bombay area to relatively distant places in the interior.

Bhopal-Bina doubling

The project for partial doubling of the (Bombay) Itarsi-Delhi main line of the Central Railway between Bhopal and Bina is reported to have been completed.

ARGENTINA

Southern Transandine line

The completion of the 150-km. section of the Southern Transandine Line between Zapala and Paso del Arco is likely to be carried out within a reasonable period as the result of conversations that recently took place between Argentine and Chilean authorities. This would create a direct link between Bahia Blanca, Argentina, and Talcahuano, Chile.

Terrorist action

A terrorist overpowered the night-watchman of the Piñeyre substation of the General Roca Railway and planted a high-powered bomb, which exploded

minutes later, causing a considerable amount of damage and putting out of commission the signalling system. Another bomb exploded in the signal inspector's office at Caballite Station of the D.F. Sarmiento Railway, without causing much damage.

CANADA

Mineral line completed

The line from Gagnon, Quebec, to Fort Cartier on the Gulf St. Lawrence, 290 miles north-east of Quebec City was completed on December 10, 1960. The 193-mile line is part of the Quebec Cartier Mining Company $200 million iron ore development in this region 450 miles north-east of Montreal. Shipments of 7 per cent iron ore concentrates will be made from Port Cartier to European and United States markets. The port, carved out of solid rock, is 50 ft. deep at low tide. The low-grade ore mined is only about 30 per cent iron and will be refined to 70 per cent at concentrators near the Lac Jeannine mine.

HUNGARY

Increase in rail passengers

The number of people travelling by rail in Hungary has increased by 35 per cent since 1957, compared to a 13 per cent increase expected by the country's three-year economic plan, which ended last month. During the same period transport of goods by rail increased by 30 per cent, compared with an anticipated rise of 16 per cent.

USSR

Siberian railway electrification

Electrification of the last 260-mile stretch of the East Siberian railway from Zima to Taishet, has been completed. The Trans-Siberian trunk line is now fully electrified from Lake Baikal to Omsk. Vladimir Gavrilov, U.S.S.R. Deputy Minister of Railways, has reported that more than 1,200 miles of line were converted to electric traction last year. The 3,290-mile Moscow-Irkutsk trunk line has been almost completely electrified. The last short stretch of this line will be electrified this year.

JUGOSLAVIA

Development loan

The United States Development Loan Fund recently approved three loans totalling $27.7 million (about £9.9 million sterling) for the economic development of Jugoslavia. One loan was made to extend the Kosovo power plant. The second was made to establish mills at the Sisak Iron & Steel works, and the third was for the purchase of 21 diesel locomotives for use on the Jugoslav Railways. The Development Loan Fund has stated that the loans will be spent in the United States.

PUBLICATIONS RECEIVED

Japanese National Railways. Recent developments on the 3-ft. 6-in. Japanese National Railways are depicted in a 72-page publication, "Japanese National Railways in 1960." The photographs reproduced in colour and monochrome, with short descriptive paragraphs, will interest all concerned with railways. Few have been seen hitherto outside Japan. Motive power and rolling stock illustrated include the "ED46" and "ED30" class a.c.-d.c. dual-purpose electric locomotives fitted respectively with excitron and silicon rectifiers; an experimental electric railcar for carrying containers; a self-propelled four-wheel van with a 180-h.p. diesel engine; an eight-wheel dual-purpose power unit equipped with a motor for working over electrified lines and a diesel engine to generate power on non-electrified sections; and a four-wheel wagon with sliding roof. Retarder and other equipment in marshalling yards; an electronic push-button device used in conjunction with a computer, for seat reservation; the wagon ferry between the islands of Honshu and Hokkaido; long-welded rails; a track recorder car for tests at speed; bridges; signalling and point equipment and safety devices, including warnings at level crossings; and overhead and other electric traction equipment also are shown. The 1960 edition of the J.N.R. "Facts and Figures" booklet gives the usual statistical and other information well set out with diagrams and photographic illustrations. There are brief comments on traffic results and trends, and notes on motive power and rolling stock, and on the 4-ft. 8½-in. gauge Tokyo-Osaka line now under construction. Copies of both publications are obtainable from the Foreign Department, Japanese National Railways, Marunouchi, Tokyo.

Dorman Long Illustrated 1960. Activities of Dorman Long & Co. Ltd. and its subsidiaries in 1960 and plans for the future are described in an illustrated booklet. Steel-frame buildings, bridges, steel-making operations, and apprentice training are depicted. They include the steel frame construction of the electrical repair shop and inspection shed at Ashford, British Railways, Southern Region, for which John Mowlem & Co. Ltd. was the main contractor. Reference is made to replacement in Dorman Long plants of steam by diesel-hydraulic locomotives to reduce air pollution and reduce fuel costs. Three types of Rolls-Royce-powered locomotive have been developed by Sentinel (Shrewsbury) Limited; a high degree of standardisation has been achieved in the engine and transmission details to facilitate maintenance.

British United Traction diesel rail power.—Since the formation in 1953 of the Diesel Train Division of British United Traction Limited, all rail-traction activities of A.E.C. Limited of Southall, Middlesex, and Leyland Motors Limited of Leyland, Lancashire, have been closely co-ordinated to enable a most efficient service to be offered to railway engineers throughout the world. In this 20-page brochure the histories of the constituent companies of B.U.T. Limited are traced and their past and present railway activities reviewed. The vast combined experience gained, in co-operation with rolling stock builders, has included the design, manufacture, and servicing of complete diesel power and control installations for railway vehicles with mechanical, hydro-mechanical, hydraulic, and electric transmission systems. Specific examples of each are quoted. Collectively the illustrations show a good cross-section of the history of British and foreign diesel railway practice in railcar, multiple-unit train, and shunting-locomotive design, right from the pioneer days of transition from petrol-engine vehicles. Perhaps the most notable trend is the steady increase in the range of B.U.T. engine powers available (up to a maximum of 360 b.h.p. per unit with pressure charging), and the almost universal adoption of the under-floor horizontal type of engine for passenger railcars. The growth of the company's oversea interests also is described. Copies may be obtained, free of charge, from British United Traction Limited, 96, Piccadilly, London, W.1.

Calendars for 1961. We have received calendars for 1961 from the Hunslet Engine Co. Ltd., the British Oxygen Co. Ltd., Brown Boveri & Co. Ltd., Daimler-Benz Aktiengesellschaft, Permali Limited, B.S.A. Tools Division, Holman Bros. Ltd., Spoorweg Sein Industrie N.V., Canadian Pacific Railway, Malayan Railway Administration, Exide Batteries Limited, South African Railways, Hawker Siddeley Industries Limited, Robert Kearsley & Company, and the Swiss National Tourist Office and Swiss Federal Railways.

RE-SIGNALLING AT PLYMOUTH
British Railways, Western Region

Exterior of Plymouth signalbox viewed from No. 3 platform

Colour-light signals and electrically operated points controlled from route-setting panel installed in one new signalbox replacing six mechanical boxes

BEFORE the 1939-45 War, it was decided that the then Plymouth North Road Station should be rebuilt, and part of the work had been carried out by the time war broke out. The station largely escaped damage from bombing, and some time after the war ended work was resumed. It is now nearly complete.

In the meantime it was decided by British Railways, Western Region, to replace a number of existing mechanical signalboxes by one new signalbox containing a route-setting control panel, operating over a wide area electrically-operated points and colour-light signals. The work was authorised in 1956, and begun the following year. It was completed and handed over to the Traffic Department on the morning of November 28, 1960.

In principle, the control panel is similar to that brought into use a few months ago at Birmingham Snow Hill, and described in our October 28 issue, but there are several important differences. One, of a practical character, is that at Snow Hill the new panel replaced two power boxes. The result was that all the existing electric point machines were in operation, so that all that had to be done during the period of changeover was to re-connect them to the new relay rooms and panel.

Plymouth was a very different story. The new box replaces six mechanical boxes, which are listed later on. The new point machines had been fixed some months before and, over a period, they had been connected to the points, operated and tested from the panel and re-connected for mechanical operation from existing signalboxes. Each set of connecting rods was then tied in a separate bundle and placed alongside points in readiness for the changeover.

Quick conversion

The occupation began at 4.25 p.m. on Saturday, November 26, and was due to end at 6 a.m. on Monday, November 28. In actual fact the signalmen were called into the new box and began working the control panel at 4 a.m.

During the intervening period, all mechanical points were disconnected and fitted for power operation from the new panel, all semaphore signals and existing track circuits were disconnected from the old boxes, and the new colour-light signals and track circuits associated with the panel were brought into use. In a few cases existing colour-light signals were converted to the new working.

During the period of the occupation very heavy rain fell and was followed by frost. The fact that the work was completed two hr. ahead of time reflects the utmost credit upon both the Signal Engineer's Department and the Traffic Department, and upon the complete co-operation which existed between them.

Six boxes replaced

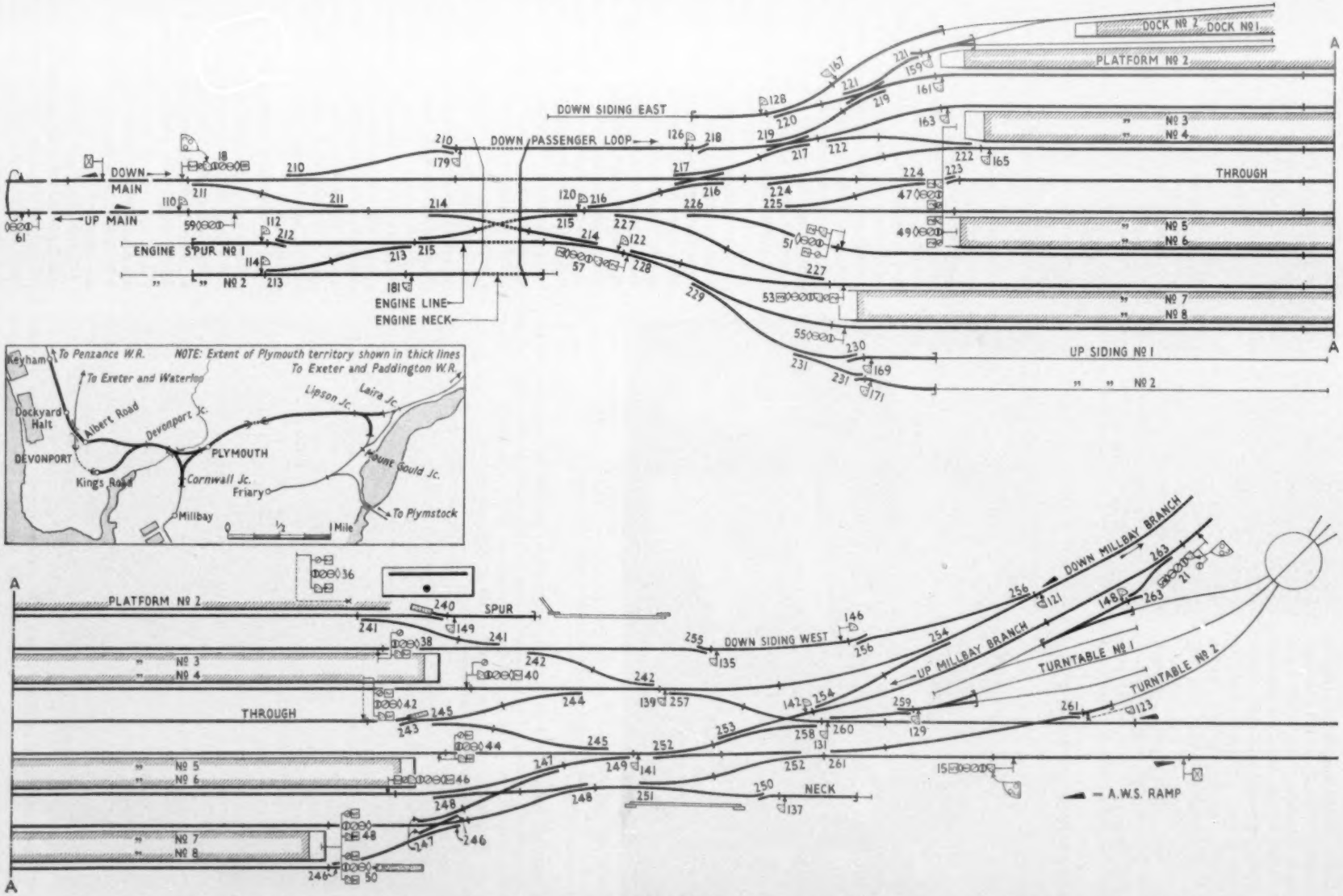
Plymouth covers a far wider area than that at Snow Hill. Its territory extends over a double-track route mileage of 5¾. This is shown in the sketch-map attached to the main diagram which is confined to Plymouth North Road Station—now called Plymouth Station. The six signalboxes which have been replaced are :—

Lipson Junction	...	35 levers
North Road East	...	183 levers
North Road West	...	63 levers
Cornwall Junction	...	39 levers
Devonport Junction	...	31 levers
Devonport, Albert Road	...	29 levers

Twenty signalmen were employed to cover the 24-hr. period at these six former boxes. Eight only are required to man the new box.

In addition extensive alterations were made at the fringe signalboxes, Laira Junction and Mount Gould Junction to the east, Millbay and Keyham to the west. Alterations and additions were needed at Devonport, Kings Road, on the Southern Region line, and this work was carried out by the Southern Region staff. Some of the signals controlled by these boxes are slotted by Plymouth.

The general layout can be seen from the sketch-map, but one or two details



Some of the lines and signalling controlled from new signalbox at the end of No. 2 platform, Plymouth, British Railways, Western Region, with map of the area

can be added. In the triangle bounded by Laira Junction, Mount Gould Junction, and Lipson Junction there is the Laira Motive Power Depot; and there are four tracks, two passenger and two goods from Laira Junction to Lipson Junction. From Lipson Junction through Mutley tunnel to Plymouth there are only two tracks.

There are eight roads through Plymouth Station itself, seven of which serve platforms. On the down side, platforms 2, 3 and 4 (there is no platform 1) are signalled for running movements in the down direction only. The through road between platforms 4 and 5, and the remaining platform lines 5 to 8 are signalled for both-ways passenger running movements.

Control and describer panels showing emergency point switches, control switches, and (above), train-describer indication units

At the west end of Plymouth Station there is a bottle-neck of only four lines, this being necessitated by a bridge over the roadway. Then the lines to Millbay diverge to the left, and the main lines to the right. In the "V" there are lines leading to a turntable.

Access to sidings and docks

Cornwall Junction is at the apex of the triangle on the lines leading to Millbay. Immediately beyond it there is access to carriage lines and sidings, but while the junction at the apex of the triangle together with a crossover are controlled from the new Plymouth box, the points serving the carriage lines are controlled from Millbay box. Millbay Station is now used for freight and parcels traffic, but some passenger boat trains use the through lines from the docks in connection with such ships as still call at Plymouth.

Proceeding westwards past the loop forming the third side of the Millbay triangle, at Devonport Junction, the Southern Region main line to Tavistock, Exeter, and Waterloo diverges to the left. This explains the apparent paradox, repeated at Exeter St. Davids, that Western Region trains for London depart at one end of the station, while Southern Region trains for London depart in the opposite direction at the other end. Beyond Devonport Junction there is Devonport Albert Road Station. Its sidings and two crossovers are now worked by ground frames, with releases from the Plymouth panel. Then comes Dockyard Halt, and finally the fringe box at Keyham Station.

Complex traffic problem

Plymouth presents a fairly complex traffic problem. First, there are the through Western Region passenger trains from Exeter and beyond to Penzance. A number of down trains, on arrival at Plymouth, detach vehicles, while additional vehicles are frequently added to up trains. Then there are a number of originating or terminating trains, including those from the Southern Region. Equally there is some through freight-train working, while a number of trains carrying parcels, perishable goods or milk originate or terminate at Plymouth. This in turn entails movements of empty stock to and from the carriage sidings at Millbay. There are also shunting movements necessitated by the formation of parcels trains.

A large number of trains change engines at Plymouth, though this work will diminish with the spread of diesel motive power. This leads to engine movements not only within the station, but to and from the motive power depot at Laira. There is also a depot for multiple-unit diesel sets at Belmont Sidings, Millbay.

Three-aspect colour lights

Coming now to the signalling, nearly all the running signals are three-aspect colour-lights, the fourth (double yellow) aspect being needed only in a few cases. The signals are equipped with 12V. 16/24W. tripole lamps, and have special lens segments to give a close-up view to a driver standing at a signal. At the outlying junctions, the various routes are indicated by junction indicators, but in the precincts of Plymouth Station and also at the former Cornwall Junction, where lower speeds are the rule, theatre-type route indicators are used. In certain cases within the station area, where the over-lap track circuit beyond a signal is not clear, or points in the overlap are set for a fouling movement, a "delayed yellow" aspect can be exhibited at the preceding signal, the aspect changing from red to single yellow when an approaching train occupies the berth track (subject to time delay unless a suitable short track circuit exists).

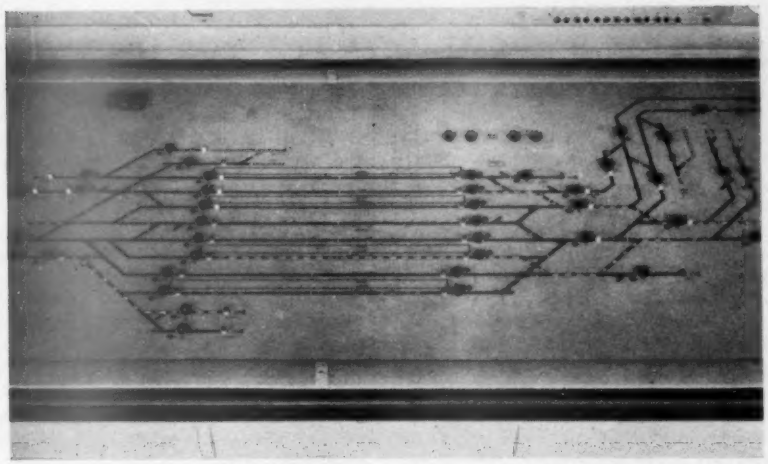
Running signals in the vicinity of the station are supplemented by position-light subsidiary signals, placed either beneath them or to one side. These show a proceed aspect only in the form of two white lights at an angle of 45 deg. In the case of signals leading into the platforms, these subsidiary signals act as both shunt signals and calling-on signals. In the latter case the letter "C" is exhibited in addition to the two white lights. Here it may be noted that each platform is long enough to contain two fairly short trains, and each platform line is divided into two track-circuits.

When a calling-on signal is given the main route-indicator displays the appropriate platform number, but for shunting movements, such as attaching an engine or van to a train, the subsidiary signal clears but no route-indication is given. The only exception to this is in the case of certain outgoing signals where the letter "X" is exhibited in the route indicator for a shunting movement leading to a "Limit of Shunt" indicator.

Miniature yellow lights

Facing movements into docks or sidings are controlled by a subsidiary aspect, again attached to the main running signals. These signals exhibit a proceed aspect only in the form of a miniature yellow light. They have their own separate stencil-type route indicators, and will not clear until the berth-track is occupied.

Position-light ground signals are of the standard type, their normal aspect being a red and white light set horizontally. When displaying a proceed aspect they show two white lights inclined at an angle of



Section of operating panel on console, showing NX switches and buttons and route-indication lights

45 deg. Where a ground signal in the facing direction has to be cleared for a running movement, this is done automatically on the setting of the route for the main signal, the ground signal being proved in the " off " position before the main aspect will clear.

Running signals in general are automatically restored to danger by the occupation of the track-circuit immediately ahead of them. If, in an emergency, a ground signal automatically cleared by a preceding running signal has to be put to danger in the face of a train which has already passed that running signal, this can be done by reversing and restoring the control switch of the ground signal.

Ground signals are restored to danger automatically by the clearance of the track-circuit immediately ahead of them after the whole train has passed, except when they are cleared automatically for a running movement, in which case they are replaced to danger as soon as the tail of the train has passed the signal.

Point detection

The point machines are Westinghouse Brake and Signal Co. Ltd. M.3 type. Detection is in the machine itself, except in the case of compound points where separate detection is provided in the four-foot way for point tongues furthest away from the machines. Track circuits are of the a.c. capacitor-fed type.

The new panel controls 252 separate routes. It operates 62 sets of points, comprising 93 point machines. There are 48 multiple-aspect signals and 36 position-light ground signals. There are 142 track-circuits.

The new signalbox is situated at the west end of No. 2 platform. The operating room is above rail level, and is approached through a small lobby. A window runs along the whole of one side, giving an extensive view of the railway tracks at that end of the station. The telephone desk with its concentrator is placed centrally, and the control panel with its route-setting switches and buttons mounted on the geographical layout diagram, and the train-describer panel, are on the side away from the window. The console is 14 ft. long and 2 ft. 6 in. wide, with the train-describer panel mounted vertically immediately above and behind the console. Normally two signalmen are employed to operate the panel.

Room for extension of console

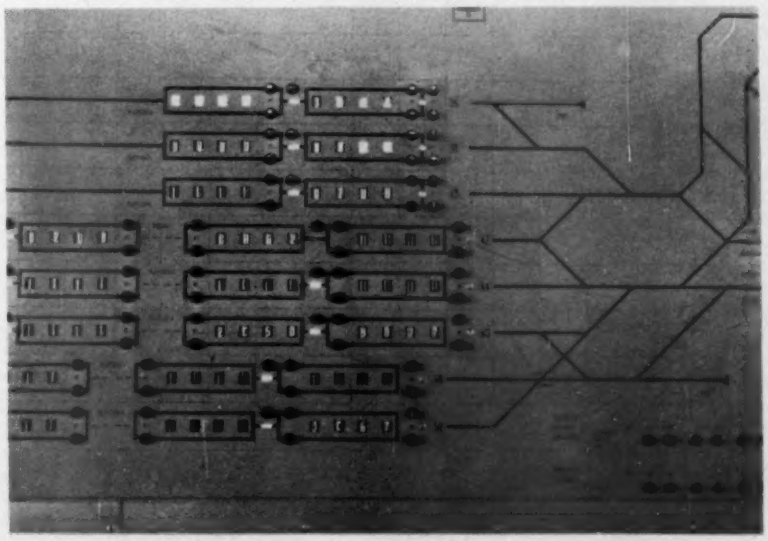
The operating room is 70 ft. long and 24 ft. wide. Thus there is ample room for an extension of the console, if at any time in the future it is decided to enlarge the territory controlled from Plymouth.

On the floor below at platform level is a signalmen's mess room and accommodation for linemen, including store rooms, and so on. Toilet facilities are provided in each section and facilities for cooking food are also available. The relay room and the power rooms are on a third floor underneath, below rail level.

As at Birmingham the control panel is a sloping console with a green matt finish and the geographical layout is shown in black. It is operated on the "entrance-exit" or "NX" system. Opposite each signal there is a rotary entrance switch marked with an arrow coloured red for a running signal and yellow for a subsidiary signal. Where a switch controls both a running and a shunting aspect it carries arrows of both colours. Immediately in rear of each signal there is an exit pushbutton, again coloured red or yellow according to whether the routes leading up to it are controlled by running or subsidiary signals.

To set up a route and signal a train forward, the signalman turns the entrance switch, so that the appropriate arrow, red or yellow, points forward in the direction of movement of the train, and then presses the exit button at the end of the route he wishes the train to take. Provided each point in the route is free to be operated, or if locked is already in the correct position, the route-calling relay will be energised and points called to the correct position as necessary. When all points in the route are detected and locked correctly the signal will clear subject to approach control as applicable.

The console is of the domino or mosaic type. It is divided into small tight-fitting segments or units, each depicting its own section of track with any associated lights, switches, or buttons. Should any adjustment or replacement be needed, the particular segment can be removed for



Part of train describer panel showing control buttons and four-symbol train-indication units

this purpose without any disconnection of the underlying wiring. This is because the connections underneath each segment are of the plug-in form.

Another advantage is that if the layout of the territory has to be altered, only the segments directly affected need to be replaced.

At the top of the console there are the individual three-position point switches. Normally these stand in the central position, all points being operated on the route setting principle as stated above. But the switches may be used to set points in the overlap and for point operation under hand-signalling conditions in emergency. Above each point switch there are three lights. The two outside white lights show the position of the points, N or R while the central, red, light is the " lock indication " working with the lock relay for the points concerned.

This lock relay is one of the most vital of the NX system. It is controlled both by the interlocking (in the normal sense of the word) and by the track circuits, including approach and route locking. If the lock lamp is illuminated, the signalman knows that this particular pair of points is locked in the position in which it lies, and that he cannot set up a new route which requires these points in the opposite position.

On the diagram on the console each signal profile has repeater lights, showing red when the signal is at danger, and green when it is at clear, the latter whatever aspect it is showing. The track lines on the diagram contain a series of short rectangular apertures. There is a white dividing line at the end of each track-circuit, while the end of the overlap beyond each signal is marked by a black dot on the white dividing line.

When the setting up of a route is initiated, the apertures in the track line defining all points which lie in the opposite position to that required begin to flash, this flashing continuing until the points in question have fully responded and correct detection has been received. When the whole route is successfully set up, the appropriate section of the track line is illuminated by white lights displayed in the apertures along the whole of its length, and when the signal clears, its repeater lights change from red to green.

Indication of train on route

When the train enters the route, the relevant lights change from white to red, and remain at red until the track-circuit is cleared. The route may be cancelled and the white lights extinguished by the replacement of the entrance switch, but if this switch is restored when a train is approaching, the route lights remain (indicating that the route is held) until the train has been brought to a stand at the signal and the appropriate time has elapsed.

When the train has passed the signal the route is also held after the entrance key has been replaced, the points being released successively after the train has cleared them.

Similarly, the approach and route-locking will prevent opposing signals being cleared after the entrance key has been restored although in certain cases this locking is released after a train has been brought to a stand at the next signal ahead.

If the over-lap track circuit is occupied or points in the overlap are set for a conflicting movement, a delayed yellow aspect is exhibited at the preceding signal.

When the overlap is fouled by trailing points in it being set in a conflicting position, then a white light appears on the diagram indicating the position of such points, but the points are not locked in this position under " delayed yellow " conditions. But once a signal has displayed an aspect less restrictive than a delayed yellow, then all trailing points in the overlap are locked. They remain locked until sufficient time has elapsed to ensure that the train has come to a stand behind the signal which is protecting them.

The position of facing points in the overlap is indicated on the diagram by a single white light in the track line aperture defining the position of these points. Facing points in the overlap become route-locked on the approach of a train, with automatic time-release to enable them to be freed subsequently after enough time has elapsed to ensure that the train has come to a stand behind the protecting signal.

In the few cases where colour-light signals controlled by " fringe " signal-boxes are slotted by Plymouth control panel, a white light appears in the appropriate aperture on the diagram when the slot is cleared.

Mounted on the console are two-position switches for freeing the Annetts Keys, which in turn release the ground frames at Cornwall Junction and Devonport (Albert Road). In addition, push-buttons with indicator lamp are provided for releasing the crank-handles kept at outlying locations (*viz.*, Lipson Junction and Devonport Junction) for use in the case of failure of a point-machine.

Communication with fringe boxes

The console also carries emergency block-bell buttons for communication with the fringe boxes. There are indications for " track-circuit indication " power-supply failure and other faults, dimming switches for both ground signals and panel indication lights, and a switch to illuminate all point indication apertures on the diagram, regardless of whether a route has been set up. This last facility is provided basically for hand-signalling. A push-button is also provided to operate an audible call device for attracting the attention of maintenance staff working at outlying locations.

" Train ready to start " indications take the form of a flashing blue light which will be displayed on the panel adjacent to the applicable platform starting signal when the " Train ready to start " plunger on the platform has been operated.

The light will continue to flash until the signal controlling the departure of the

Continued on page 54

Interior of main relay room in basement

ELECTRIC RAILWAY TRACTION SECTION

A.C. locomotive equipments

A DESCRIPTION of the a.c. electric locomotives constructed by British Railways at Doncaster with electrical equipment by Associated Electrical Industries (Rugby) Limited appears on pages 50 to 53 of this issue. This completes our descriptions of the five designs of locomotives currently being built for operation on the 25-kV. system of British Railways.

In accordance with specified requirements, certain features and items of equipment are standardised throughout the range of locomotives. These include the Stone-Faiveley pantograph, the Brown-Boveri circuit breaker, the master controller arrangement, and the cab layout and frontal appearance. Also, all locomotives are of the Bo-Bo wheel arrangement. In most other respects, the manufacturers were free to produce their own designs to meet the specification.

The designs of the main transformers fall into two basic categories, that selected by Associated Electrical Industries (Manchester) Limited and General Electric Co. Ltd., arranged for top-changing on the h.t. side, and that with l.t. tap-changing, chosen by A.E.I. (Rugby) Limited, and English Electric Co. Ltd. Both systems are claimed to have their several advantages ; those for the former include low currents handled by the tap-changer, provision of a large number of notches at low cost and weight, and improved current-speed characteristics at low speeds. Among the advantages claimed for the l.t. system may be mentioned its suitability under the dual-voltage supply conditions, allowing full rated output on 25 kV. and on 6·25 kV. without increase in weight, and its superiority in respect of power factor and efficiency.

The mercury-arc rectifiers, which are used on all the contractor-built locomotives are of various types. The A.E.I. (Rugby) equipment includes three rectifiers in parallel, each consisting of a six-anode, air-cooled, pumpless, steel-tank unit, arranged for bi-phase operation. The G.E.C. rectifiers, of which there are 16, are of the sealed steel tank, liquid-cooled, excitron type. The English Electric locomotive has eight rectifiers of the sealed ignitron type, the vacuum vessel being of stainless steel and water-cooled. The A.E.I. (Manchester) rectifiers are similar to those of the Rugby equipments.

On the fifth group of locomotives, namely, those with British Railways built mechanical parts and A.E.I. (Rugby) equipments, the opportunity was taken of installing semi-conductor rectifiers, 30 of which are of the germanium type and the remaining 10 of the silicon type. It will thus be possible to gain valuable experience with five types of rectifier under comparable service conditions. In addition, the saving in space and weight obtained by the use of semi-conductor rectifiers has allowed the installation of rheostatic brake equipment.

A comparison of the main power circuits favoured by the various manufacturers is interesting. On the A.E.I. (Rugby) locomotives, the primary winding of the main transformer is in four sections, arranged for either series or parallel connections to suit the supply voltage. Two of the three separate secondary windings each give half the rectifier phase voltage and are each connected in series with tappings at half rectifier phase voltage from a centre-tapped auto-transformer. The latter is energised by the third secondary winding on the main transformer. By this arrangement, the rectifier voltage is varied by the buck-and-boost effect of the auto-transformer, and the number of transformer taps and contactors necessary is reduced to a minimum. The three rectifiers in parallel supply the four traction motors, also connected in parallel.

The G.E.C. system embodies tap-changing on the h.t. winding of the main transformer. Two secondary windings supply the 16 rectifiers, which are grouped into two bridges circuits, each supplying a pair of traction motors, connected in series. The mid-points of the motor circuits are connected to earth and to the mid-points of the secondary windings, an arrangement which allows a single motor or a bogie pair of motors to be isolated.

On the English Electric locomotives, the main transformer windings are arranged in a similar manner to that of the A.E.I. (Rugby) scheme, to suit either the 25-kV. or the 6·25-kV. supply. The secondary windings consist of two tapped sections and two untapped sections. Each tapped section is used twice during acceleration, first alone and then with the untapped section in circuit. In this way, economy in tappings and contractors is achieved. The rectifier and traction motor circuits are similar to those on the G.E.C. locomotives, so that although each pair of motors is connected in series across the rectifiers, the connection between the mid-points of the motor circuits and the secondary winding of the transformer results in all motors being effectively in parallel. The tendency to wheel-slip is thereby reduced, and the voltage to earth is kept at a reasonable value.

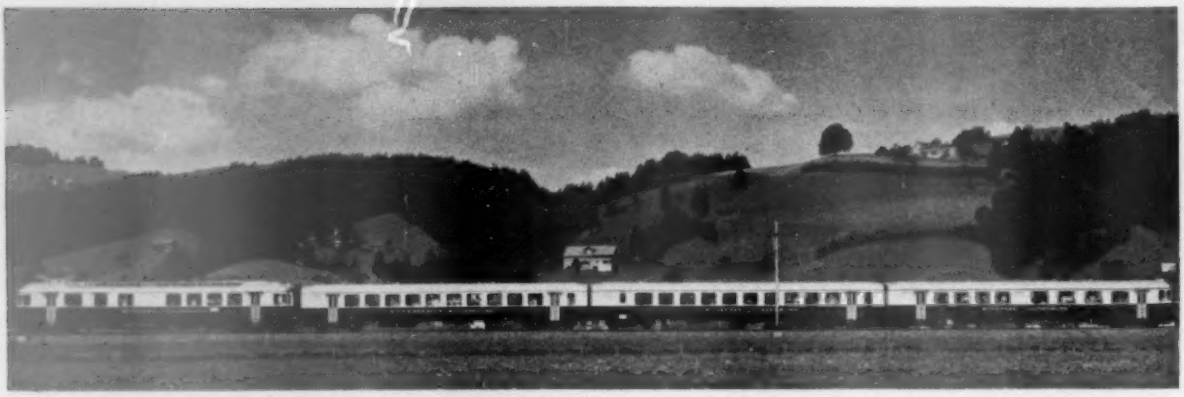
Variation of the main transformer secondary voltage on the A.E.I. (Manchester) locomotives is effected by high-tension tap changing on an auto-transformer. A quarter-voltage tapping is provided for operation on the lower supply voltage and the full range of voltage variation is catered for by the provision of 38 taps, connected to the tap changer. The main transformer secondary winding supplies three bi-phase rectifiers which feed the four parallel-connected traction motors. The traction motor circuits are completed by connecting them to the mid-point of the transformer secondary winding.

All makes of locomotive are equipped with six-pole traction motors, with the exception of English Electric, which uses four-pole machines. They follow, in general, conventional d.c. practice, but modifications have been introduced to minimise the effects of ripple which is present in the rectified a.c. supply to the motors. In all cases the motors are resiliently frame-mounted on the bogies, power being transmitted to the axles through flexible drives, of which there are two variants. English Electric and G.E.C. use a resilient drive of the Brown-Boveri spring type, while all the A.E.I. locomotives are fitted with a flexible-link drive based on the Alsthom system.

A considerable measure of uniformity exists between the various makes on the types of motors used for driving auxiliary machines. Generally fans, blowers and pumps have a.c. motors, while compressor and exhauster motors are of the d.c. type.

Variations in the methods of providing the supplies for the auxiliaries are evident among the different makes of locomotive. On the A.E.I. (Manchester) locomotives a tapping on the auto-transformer gives a 240-V. single-phase supply for the a.c. machines, and, via an auxiliary transformer for d.c. G.E.C. has also adopted a 240-V. supply for the a.c. auxiliaries, taken from an auxiliary winding on the main transformer. On all the A.E.I. (Rugby) equipments, the auxiliaries are supplied at 139-V. a.c. from an auxiliary winding on the main transformer. English Electric is alone in adopting the three-phase system for the a.c. auxiliaries.

This outlines just a few of the different approaches adopted by the various manufacturers towards solving the many problems encountered in the design of these prototype a.c. locomotives. An eventual report on the performance of these equipments under service conditions would be a matter of major interest.



Four-car 2,450-h.p. Bodensee-Toggenburg fixed-formation train with Swiss Federal car in the formation

MODERN ELECTRIC PUSH-AND-PULL TRAINS

High-power design for mountain-grade and stopping-train services in Switzerland

THOUGH the Bodensee-Toggenburg Railway (B.T.B.) in the north-east corner of Switzerland has a route length of only 35 miles its importance is much greater than that mileage would suggest, for it gives connection from the industrial and thickly populated canton of St. Gall into the centre of Switzerland with a line running from the shores of Lake Constance over the hills to Rapperswil; also it works closely in connection with the Swiss Federal Railways (S.B.B.) and also with the Swiss South-Eastern Railway (S.O.B.) in regard to through coach workings.

For almost 30 years electrified on the 15-kV. 16⅔-mile single-phase system, the B.T.B. has always been well forward in its motive power design, and recently, in the 50th year of its existence, it has acquired special new stock for operation in a push-and-pull train of four bogie vehicles with refreshment car facilities. As evidence of the close working collaboration with the S.B.B., one of the coaches in this train is S.B.B. property.

One of the main duties of the train is a through service over the B.T.B., S.O.B., and S.B.B. systems from Romanshorn to Luzern, via Rapperswil and Arth-Goldau, a distance of 105 miles, with two distinct summits, and ruling gradients of 2 per cent (1 in 50) on the B.T.B., 1·6 per cent (1 in 62) on the S.B.B., and as much as 5 per cent (1 in 20) on the S.O.B. The overall journey time is 3 hr. 20 min. inclusive of about 20 intermediate stops, most of which are on the B.T.B., for on the present service the train stops at every station between Romanshorn and St. Gall.

All-welded steel frame of motor-coach under construction at Neuhausen works

Train make-up

In formation the new train comprises a B.T.B. motor-coach with second class seating and a baggage room of 161 sq. ft. floor area; an S.B.B. second class coach; a B.T.B. composite kitchen-buffet second class coach; and a B.T.B. control trailer with first and second class accommodation. All cars are alike in general conception and construction, though there are slight variations in length, and they form a harmonious complete train, which is painted throughout green below the waist line and cream above, with aluminium-colour roof. The motor-coach was made by Schweizerische Industrie Gesellschaft (S.I.G.), and the three trailers by Schweizerische Wagons- und Aufzügefabrik A.G. (Schlieren); electrical equipment is of Brown Boveri manufacture. General dimensions and capacity of the train are best given in tabular form, as made up in the table on page 49 and the general appearance is as shown at the head of this article. The motor-coach is of Bo-Bo axle arrangement.

Interior of first class saloons in control trailer

Motor-coach

Construction of the motor-coach is of all-welded steel forming an integral box-like shell, but strengthened in the floor and underframe section, particularly over the centre length where are carried the transformers and certain other electrical equipment weighing 9 tons. The side panels are 2·5 mm. steel plates sharing in the load-carrying; the floor is of corrugated plate supported by the longitudinals and by numerous cross stretchers; the side frame is principally in the form of strong double pillars tied by the cantrail and waist rail and swept into the solebar member with large-radius fillets. Design of the frame is influenced by the need for swing and sliding doors in the 27-ft. luggage room behind the driving cabin, and by the

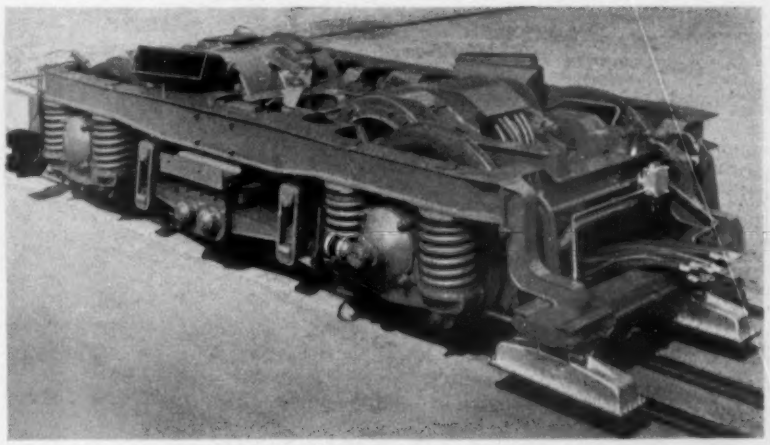
presence at mid-length of an equipment cubicle at one side which has a folding outside door going up to cantrail level. The weight of the whole motor-coach frame including side walls, roof and floor plates is about 11 tons; and the whole superstructure including equipment, seats and all interior fittings weighs about 40 tons.

Seats, 32 in number, and interior fittings and lighting in the passenger saloon are to current Swiss standards found in centre-aisle coaches. Windows are of safety glass, and lighting is by two lines of fluorescent tubes. The corrugated floor plate has an anti-drumming material on the underside and an insulation covering, and wooden floor boards covered with composition material. The inner side panelling is of Durolux hardboard with mottled finish. In the driving cab is an end hinged door to give passage for the train crew if the motor-coach should not be the end vehicle in a train. At the inner end there is a bellows gangway, but this makes connection with a rubber-bolster vestibule on the adjacent trailer; and the remainder on the interconnections between the trailers are also of rubber-bolster type.

All axles in the motor-coach are driven by individual fully-springborne motors, the drive being of the hollow shaft and spring type. The bogies are of S.I.G. torsion-bar type with the usual Swiss form of cylindrical axlebox guides surrounded by helical springs and containing friction dampers. Axleboxes are of roller type. Oerlikon straight and automatic air brakes are fitted to the motor-coach, and there is one bogie-mounted cylinder for each wheel pair; it is a two-stage brake with 75 per cent braking force up to 25 m.p.h. and 115 per cent above that speed.

Trailers

Construction of the trailers is on similar lines to that of the motor-coach, but to lighter scantlings, and the weight of the framing including side, floor and roof plates, of a 75-ft. trailer approximates to nine tons; there is about 5,200 ft. of welding in such a frame. The inner surfaces of roof, floor and side walls are sprayed with asbestos to a thickness of 1 in., and this is applied also in the motor-coach. All passenger entrance doors throughout the train are of double-hinged light-metal type, and can be opened and closed by hand, or by electro-pneumatic power from the driving position.



S.I.G. torsion-bar bogie for motor-coach; bracket and two shoes at the near end are for a.t.c. operation

In the trailer immediately behind the motor-coach, i.e., the S.B.B. vehicle, the 80 seats are arranged equally in two open saloons—one smoking and the other non-smoking. In the next trailer is a kitchen at the near end and then a saloon with 26 seats having tables between each pair, and to which light meals are served; the remainder of the coach contains 32 seats and a toilet compartment. In the control trailer is a second-class non-smoking saloon, a lavatory compartment, and then smoking and non-smoking first-class saloons, each with 12 seats, and finally the full-width driving cabin. Heating in the trailers is by electrically-warmed air currents, whereas in the motor-coach there are resistance heaters.

Bogies in the trailers are of the normal Swiss bolster type with roller-bearing axleboxes in a cradle supporting helical springs, and with the cylindrical guides within the springs. Inside these guides are hydraulic dampers. The box-form frame is completely welded up of St.37 steel. The bolster is supported on helical springs; and the coach body is carried at the sides on bronze slides supported on spring pads with hydraulic shock absorbers mounted on rubber pads.

Vehicle	Motor-coach second class luggage	Trailers		Control trailer first and second	Whole train
		Second class	Buffet/second		
Owner	B.T.	S.B.B.	B.T.	B.T.	
Type and number	BFe4/4050	B4bü's 6000	Br4bü's 250	ABt4bü's 150	
	ft. in.	ft. in.	ft. in.	ft. in.	
Length over buffers	77 11	77 11	79 0	78 9½	314 ft.
Length of car body	73 5	73 5	75	74 9½	
Width of car body	9 6½	9 6½	9 6½	9 6½	
Roof height above rail	12 5	12 2	12 2	12 2	
Height over locked-down pantograph	14 9	—	—	—	
Floor height	4 2½	3 7½	3 7½	3 7½	
Bogie pivot pitch	54 1	57 8½	58 0½	57 6	
Bogie wheelbase	9 10	8 10	8 10	8 10	
Wheel dia. (new)	41 in.	35.8 in.	35.8 in.	35.8 in.	
First class seats	—	—	—	24	24
Second class seats (revenue)	32	80	32	31	175
Refreshment room seats	—	—	28	—	28
Drop seats	4	4	2	4	14
Total number of seats	36	84	62	59	241
Parcels or luggage weight	4 tons	—	—	—	4 tons
Parcels or luggage room	161 sq. ft.	—	—	—	161 sq. ft.
	tonnes	tonnes	tonnes	tonnes	tonnes
Weight: mechanical portion	34	30	33.5	30	127.5
Weight: electrical portion	36	—	—	2	38
Weight: Total empty	70	30	33.5	32	165.5
Weight: Fully laden	76.5	35.5	36.5	36	184.5

Electrical equipment

Though the train weight is fixed, at 163 tons tare and about 185 tons fully laden, a considerable amount of power has been provided because of the steep gradients and the speed at which it is desired to run up them on certain workings; and also because on special occasions it is necessary to haul trailers over the B.T.B. and S.B.B. sections, though not over the mountainous S.O.B. division.

On the continuous rating 1,800 kW. (2,450 h.p.) of traction-motor output is provided, on the one-hour rating 2,100 kW. (2,860 h.p.), and on the 15-min. rating 2,240 kW. (3,050 h.p.). The continuous rating is equivalent to over 13 h.p. per ton of fully laden train weight. Each Brown Boveri model "ELM. 683 St" force-ventilated traction motor is a 10-pole compensated single-phase series machine with a continuous rating of 450 kW. at 1,120 r.p.m. 380 V. 1,400 A. and 2,880 lb.-ft. torque. On the one-hr. rating the data are 525 kW. at 1,050 r.p.m. 380 V. 1,600 A. and 3,530 lb.-ft. torque. Reduction-gear ratio is 1: 2·78, wheel dia. 41 m., and motor weight 5,600 lb. The four traction motors are connected in parallel.

The main transformer, carried below the motor-coach floor, has ratings of: traction 1,715 kVA., auxiliaries 50 kVA., and train-heating 400 kVA. With the line current at 15 kV. this transformer supplies heating current at 1,042 V., auxiliary current at 180 to 250 V., and

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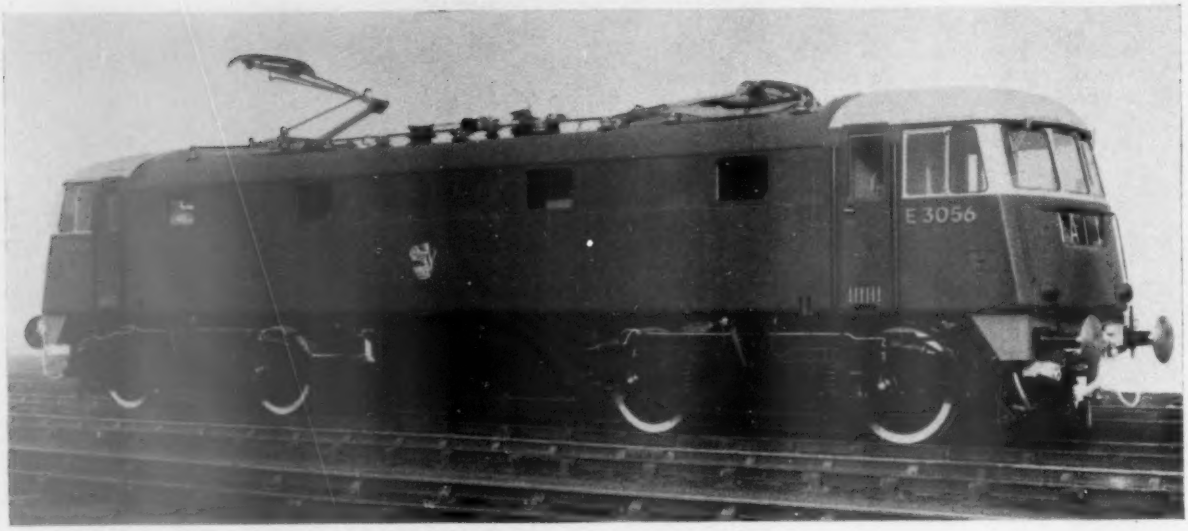
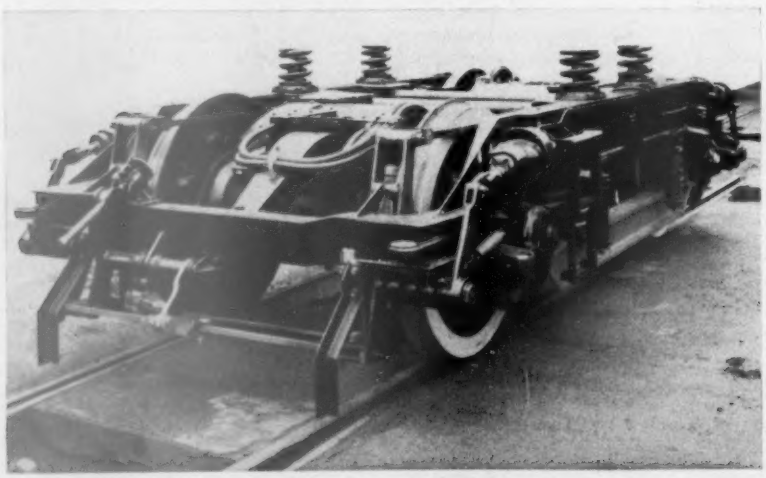


British Railways Type "A" a.c. electric locomotive

HIGH-VOLTAGE A.C. LOCOMOTIVES built by British Railways

Type "A" units incorporating semi-conductor rectifiers and rheostatic braking for the London Midland Region

DELIVERIES will shortly be in progress from British Railways workshops, Doncaster, of 40 25-kV./6·25-kV. 50-cycle a.c. electric locomotives for operation on the London Midland Region. The serial numbers allocated to this order are E3056-E3095 inclusive. Designed at Doncaster to the requirements of the Chief Electrical and the Chief Mechanical Engineers of the British Transport Commission, this locomotive incorporates A.E.I. (Rugby) Limited electrical equipment. This equipment is generally similar to that fitted in the A.E.I. (Rugby) E3001/23 locomotives except that semi-conductor rectifiers and rheostatic braking are used. On 30 equipments (E3056 to E3085) the rectifiers are germanium, with silicon on the remaining 10 (E3086 to E3095). It is expected that the use of the rheostatic brake will effect a considerable reduction in brake gear maintenance and in wheel wear. The power compartment body has been designed to provide maximum access to equipment during maintenance.



Alsthom type bogie, showing brake cylinder mounting and spring loaded side bearers

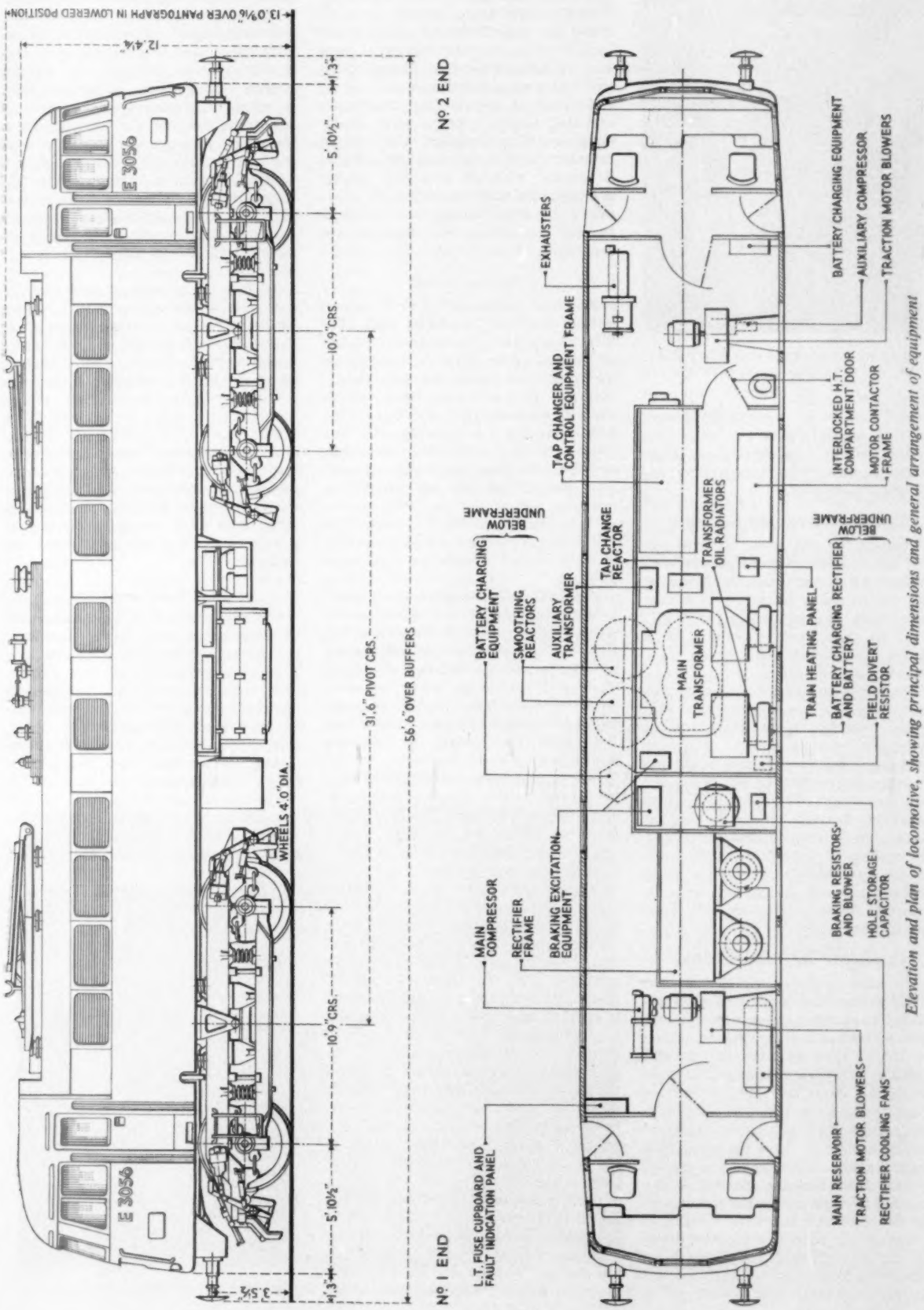
Leading characteristics are as follow:—
(Performance figures are based on a supply voltage of 22·5-kV. or 5·63-kV.)

Wheel arrangement		Bo-Bo
Maximum service speed		100 m.p.h.
Weight in working order		80 tons
Maximum axle load		20 tons
Continuous ratings	Full field	Weak field
Tractive effort—lb.	20,000	17,000
Speed—m.p.h.	60	71
Horse power	3,220	3,220
Max. T.E. at 26 per cent adhesion		48,000 lb.
Weight of electrical equipment including drive		39·6 tons
Weight of two bogies (excluding motors and drive)		20·6 tons
Weight of underframe and body		19 tons
	ft.	in.
Length over buffers	56	6
Height over cab	12	4½
Overall width	8	8½
Bogie wheelbase	10	9
Bogie pivot centres	31	6
Wheel diameter	4	
Gear ratio	29/76	

Equipment layout

The main equipment is installed in two totally enclosed compartments, one of which contains the rectifier and rectifier cooling fans. The corridor adjacent to the rectifier unit is of sufficient width to withdraw the cell trays for servicing. In the central compartment are the main transformer and oil cooling equipment, tap changer, motor contactor frame, braking resistors, and train heating panel. The transformer cooling fans and radiators are mounted above the transformer. The access doors to this compartment are fully interlocked with the pantograph raising and roof earthing gear.

Between the h.t. equipment enclosure and the cab rear bulkhead at No. 1 end are the brake compressor and main air reservoir, one traction motor blower, A.W.S. equipment, and the fault indication panel. In the compartment behind No. 2 cab are the two brake exhausters, an auxiliary battery-driven compressor, one traction motor blower, battery charging equipment, and a chemical



Elevation and plan of locomotive, showing principal dimensions and general arrangement of equipment

Tap changer and motor contactors in h.t. compartment

toilet. Equipment underslung between the two bogies include the smoothing chokes, battery box, field shunt divert resistor, auxiliary equipment rectifier, and the brake reservoirs.

Current collection and conversion

Mounted on the power compartment roof are two Stone-Faively pantographs, the Brown Boveri air-blast circuit breaker, and the potential measuring unit associated with the operation of the 25-kV./6·25-kV. changeover switch. Control of the air-operated switch is by relay-operated magnet valves.

The oil-cooled transformer and changeover switch are mounted in a steel tank which is carried on the underframe on resilient trunnion mountings. The primary winding is in four sections which may be connected in series or parallel to suit the line voltage. Oil cooling is by pump circulation through two Serck radiators mounted in the power compartment roof. The cooling air is ducted from the bodyside to two horizontal blowers which discharge upwards through the radiators. Louvred aluminium covers are fitted over the roof outlets.

Germanium and silicon rectifiers

The semi-conductor rectifier is built up with strings of cells mounted in vertical trays. On the germanium type there are 20 trays, each containing 64 cells, and on the silicon type 12 trays of 28 cells. Individual trays are arranged to slide out of the frame into the corridor for inspection and maintenance. The cells are in series and the strings connected in parallel groups to form the arms of a bridge circuit. Each tray is protected by four fuses and the locomotive can continue to operate on a full power with one string of cells cut out. Cooling is by two vertical axial flow blowers, drawing air through the bodyside, down through the blowers and upwards through the rectifier frame. The cooling air is discharged through louvred roof traps. The d.c. smoothing chokes mounted below the underframe are naturally air-cooled. The external cylindrical core and the coils, wound on flat strip, are enclosed in a glass-fibre casing.

The control gear and tap changer are mounted together on a steel frame. Operation of the contactors is by moulded cams on a steel camshaft. The camshaft is driven, through reduction gearing and a geneva stop mechanism, by a d.c. motor on which dynamic braking is used. De-ion arc chutes are fitted to the contactors.

Traction motors

The four traction motors are six-pole series-wound d.c. machines with class "H" insulation. To eliminate the effect of the a.c. ripple of the 50-cycle supply the poles are interconnected with a shallow laminted ring. Each motor has a continuous rating of 975V., 700A., 847 s.h.p., and a 1 hr. rating of 975V., 760A., 920 s.h.p. The motors are fully suspended on three-point rubber mountings; two at the nose and one on an extension arm at the rear. The motors are fully interchangeable with those of the A.E.I.(Rugby) Limited-Birmingham Railway Carriage & Wagon Co. Ltd. locomotives.

From the reduction gearing, which has a ratio of 29 : 76, the drive on the Alsthom system is taken through a quill shaft to a universal link assembly, which in turn drives the wheels. The quill shaft is carried in the motor frame in large diameter taper roller bearings. Rubber bushed pivots are used throughout the linkage to eliminate lubrication.

One pedestal-mounted blower is fitted for the two traction motors of each bogie. Air is drawn through glass-fibre ducting from louvres in the bodyside. Glass-fibre ducting, built into the underframe, is also used to distribute the air to the motors.

The driving cab at each end is of double-skin construction, with steel sheets on the outside carried on a steel frame. The roof is lined with a glass-fibre moulding and the sides with plastic-faced plywood panels. Sprayed asbestos is applied inside the cavity for heat and sound insulation. Up to window level the cab sides are an integral part of the main frame structure. Flanged plates are used for the cab front to provide maximum stiffness. Double-glazed armour-plate glass is used for the front screens. Pneumatic screen wipers and electric demisters are fitted on the two large screens.

Driving controls on the plastic-covered desk are arranged in the B.R. standard form used on all a.c. electric locomotives. The master controller, for operating the tap changer, and the reverser with positions for forward, off, and reverse, are on the driver's right and the vacuum and straight air brake controls on the left.

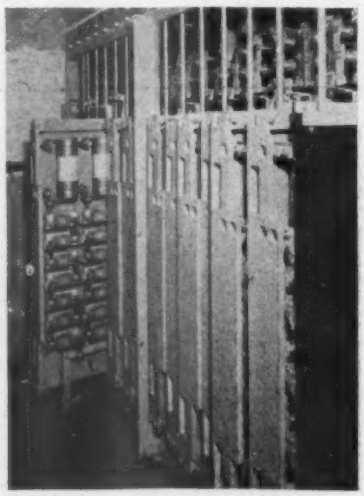
Flush-mounted on the sloping instrument panel fitted below the driving window are the air pressure and vacuum gauges, speedometer, ammeters, light switches and indicator lamps. Coloured sectors are used on the ammeter scales for driver guidance during acceleration and running. The cab is well heated by a number of electric heaters and a full height draught screen is fitted behind each of the fully upholstered adjustable seats. Access to the power compartment is by a central door in the cab rear bulkhead.

In this design the requirements of minimum weight and a rigid structure has been obtained by combining the lower halves of the bodysides and the underframe to form a deep trough-section structure. The complete roof and top portion of the bodysides down to the bottom of the windows is made up as a light steel frame covered with riveted aluminium panels. Welded aluminium roof traps are fitted to facilitate the removal of individual items of equipment. The lower bodyside panels are in $\frac{5}{16}$-in. steel plate, flanged at the top to provide stiffness and a seating for the roof unit.

Underframe assembly

The underframe is a welded assembly of seven box sections, comprising drag box and cabs, bogie centres, intermediate sections and transformer well section. The vertical lateral and longitudinal members are in $\frac{5}{16}$-in. plate and the top and bottom plates are $\frac{3}{8}$-in. thick. Oleo-Pneumatic buffers are fitted, the buffing and drawgear loads being taken on the main frame.

The four-wheel bogies are of the underslung equalising beam type, the beams being carried from the Timken roller bearing axleboxes on combined



Rectifier tray withdrawn for inspection

shear and compression rubber pads. The Alsthom system of rubber cone pivot body suspension and radius arm guided axleboxes is incorporated. The bogie frame consists of an assembly of rolled steel channel side members, welded to form a box section, and fabricated transoms and headstocks. Four double-coil helical springs support the bogie frame on the equalising beams.

The body is carried on each bogie on a double-ended cone rubber pivot fitted into the top and bottom centre members. A transverse spring anchorage maintains the vertical alignment of the pivot. A proportion of the body load is transmitted to the bogie through four spring-loaded side bearers, fitted with manganese rubbing plates. Rubber bushes are used wherever possible to cushion the loads and to eliminate lubrication. Sanding is applied to the outside wheels of each bogie.

Brake equipment

The brake equipment provides for air braking on the locomotive and vacuum braking on the train. Rheostatic braking is incorporated in the power circuits to reduce the tyre and brake block wear on long down grades. When hauling vacuum braked stock the locomotive air brakes are controlled by the drivers' vacuum brake valve. An independent air brake valve is fitted for use when running light and when hauling unbraked trains. A braked/unbraked switch is fitted to control the application rate of emergency applications when hauling unbraked stock. The antislip brake, giving a partial brake application to check wheel slip, is push button controlled.

The clasp brake rigging on each bogie is operated by four externally mounted 8-in. dia. cylinders with slack adjusters incorporated. Renewable cast-iron brake shoes are fitted, and self-lubricating bushes are used in the brake rigging to reduce maintenance. All equipment, which is of Westinghouse design and manufacture, is of the latest light-weight type incorporating synthetic rubber valve seats and rubber diaphragm operated valves.

Air for the brakes and other services is supplied by a motor-driven type 2.E38 two-stage compressor, the main reservoir pressure being automatically maintained between 85 and 100 lb. per sq. in. Vacuum for the train brake operation is created by two type 4V.110 two-speed exhausters. These normally run at 600 r.p.m. but may be speeded up to 1,200 r.p.m. for quick brake release by depressing the brake valve handle. When passing through a neutral section one exhauster only is run from the battery to maintain the train pipe vacuum. The handbrake, applied to one axle per bogie, is operated from the cab through a chain drive to a shaft fitted with universal couplings.

Rheostatic brake

The rheostatic brake, in which the traction motors are switched to function as generators driven by the wheels, provides a braking effort of 24,000 lb. between 10 m.p.h. and 21 m.p.h., dropping to 8,000 lb. at 70 m.p.h. Braking is controlled by the master controller handle, a selector switch being fitted to enable the braking or power circuits to be selected. The four traction motor fields are connected in series, excitation being provided by a step-down transformer. Current is dissipated in a force-ventilated resistor connected across each armature, the cooling fan delivery being automatically regulated to suit the amount of cooling required.

Air is drawn through the underframe and, after passing through the vertical stack of resistors, is discharged through hinged louvred flaps in the roof. A partial air-brake application is made automatically if the rheostatic braking is not maintained after switching in.

The principal sub-contractors are as follow:—

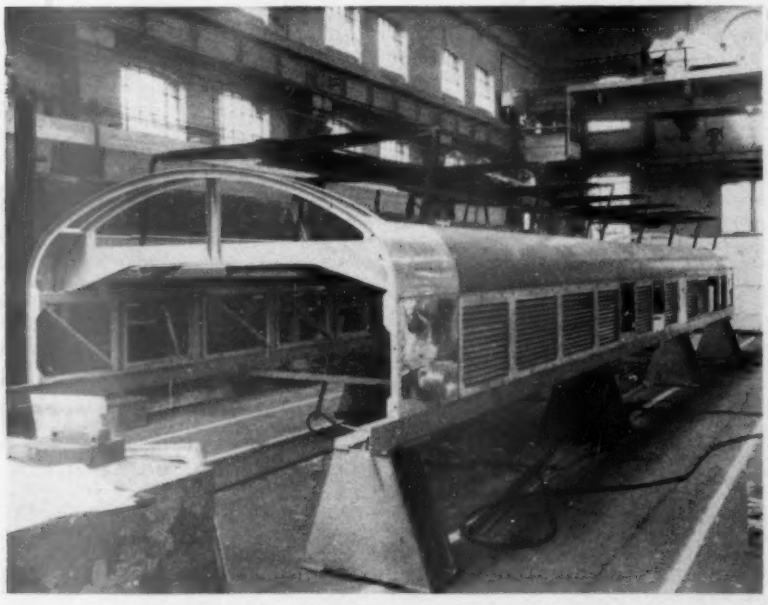
Main electrical equipment	Associated Electrical Industries (Rugby) Limited
Brake equipment ...	Westinghouse Brake & Signal Co. Ltd.
Axleboxes	British Timken Division of the Timken Roller Bearing Company
Buffers	Oleo Pneumatics Limited
Radiators	Serck Limited
Drop windows ...	Beckett, Laycock & Watkinson Limited
Front window heater	A.E.I. (Manchester) Limited
Windscreen wipers ...	Trico Folberth Limited
Bogie pivot rubbers ...	Empire Rubber Co. Ltd.
Pantographs	J. Stone & Co. (Deptford) Ltd.
Air - blast circuit breakers	Brown Boveri & Co. Ltd.
Traction motor blowers, and transformer and rectifier fans ...	Aerex Limited
Batteries	Nife Batteries Limited
Cab instruments ...	Nalder Bros. & Thompson Ltd.
Route indicators ...	Transport Engineering & Equipment Company
Hydraulic dampers ...	Woodhead Monroe Limited

Modern electric push-and-pull trains

Concluded from page 49

traction current over the range from 76 to 570 V. Cooling of the transformer is by oil, which is itself cooled by air in a group below the car floor. There is only one pantograph on the train—at the outer end of the motor-coach. The control is on low voltage and the driver's controller has 28 traction notches. An anti-slip brake is fitted.

Supplementary to the air brake is an electric separately-excited d.c. resistance brake, the resistances for which occupy almost the whole of the motor-coach roof behind the pantograph, where they obtain natural air cooling. Continuous braking effort is equal to 1,000 kW., and a peak braking effort equal to 2,000 kW. can be attained; there are 35 resistance-brake notches.



Complete roof and top bodysides made as a light removable unit

INDIAN INDUSTRIES FAIR, 1961

Over 1,500 British firms have been invited by the Board of Trade to join in the British display at the second Indian Industries Fair, to be held in Delhi from November 4 to December 21, 1961. Other countries exhibiting include Russia, the U.S.A. and Germany. The British area will consist of: (a) an official display of approximately 20,000 sq. ft. depicting Britain's contributions to the industrial development of India; (b) a shell stand scheme organised by the Board of Trade and leased in units to firms; and (c) stands installed by firms of British origin established in the Indian market. Mr. Charles Munro, has been invited to design the official exhibit in conjunction with the Central Office of Information.

Re-signalling at Plymouth, British Railways, Western Region

Concluded from page 46

train is cleared, when the light will be extinguished.

Indicators are provided as follows:—

For trains starting in the down direction:—Platforms 2, 3, 4, 5, 6, 7, 8.

For trains starting in the up direction:—Platforms 5, 6, 7, 8.

The train describer is on a vertical panel immediately above and behind the console. On this panel there is a second track diagram in simplified form depicting the main routes for which train description facilities are available. Train descriptions are displayed on this diagram at each point of entry to the territory and at each main running signal.

The descriptions are in the standard Western Region four-character code, example is "2C72." At each location as defined above there are one or more display units, each unit containing four apertures, one for each symbol of the code. Where only one train can stand at a time, there is only one unit, but if more than one train is permitted, additional units are provided. At Plymouth each platform can accommodate more than one train. Platforms 2, 3 and 4, which are signalled for down working, each have two units. The through line and the remaining platforms, which are signalled for both-way working, have four units—two up and two down.*

Automatic description

Once a description has appeared on the diagram, it moves forward automatically from unit to unit, as the train proceeds from signal to signal. An ordinary telephone dial is provided at the bottom of the describer panel. If a signalman wishes to interpose a train description at any point, he first dials its four-symbol description, and then presses a button adjacent to the required unit. If he desires to cancel a train description he presses a second button adjacent to that unit. Special indication and alarm arrangements are provided in case a further train should enter a section for which all the display units are occupied. There are also push-buttons along the bottom of the describer panel, for transmitting descriptions forward to the fringe boxes.

Adjacent to the display units there are also indicators and buttons connected with the signal-post telephones. By means of the buttons, any of these telephones can be connected to hand-sets kept on a sliding shelf immediately below the console. Also on the describer panel there are further buttons and indications enabling the signalman to communicate with the out-lying ground frames in the territory by means of one of the hand-sets. Two further hand-sets below the console are for box-to-box purposes and these may also be connected to the telephone concentrator panel.

The telephone concentrator panel is located on a desk between the main window and the panel. It contains 10 lines, with room for extension. It has connection facilities to the relay room, the station platforms, Plymouth Railway Exchange, Train Control, relevant motive power depots and carriage sidings, and also with omnibus telephone circuits to signal-boxes in the up and down direction. A double-glazed enclosure is provided on the operating floor to house the train announcer.

Relay rooms

The main relay room is in the basement of the signalbox, below rail level. There are also two outlying brick-built relay and battery rooms, one at Lipson Junction and the other at Devonport Junction. These last contain the local point contactors, local point control relays, and local track relays, which control, in turn, track repeater relays in the main relay room. Small pre-wired racks for plug-in relays are also provided in Western Region standard line-side cupboards.

The battery house at each of the two outlying relay rooms contains a bank of 110V. lead-acid low-loss type cells. These are used for local point operation, and so are made capable of meeting heavy intermittent loads of short duration at frequent intervals during the 24 hr. Stand-by capacity is not required because of the guaranteed main supply feeding the battery charger.

The main relay room is 82 ft. by 28 ft. in size. It provides ample room for the relay racks and in addition to all the necessary point contactors, it contains 2,120 signalling relays of the plug-in type, 121 of these being thermal (time-element) relays. It also contains 1,705 plug-in telephone-type relays (used for non-safety signalling circuits). These non-safety telephone-type relays are mounted in the relay racks in units of five each. For all other purposes, where "safety side" circuits are involved, plug-in full-size signalling type relays are used.

The main signalling cables are of the multi-core impregnated paper-insulated lead-sheathed type to Western Region Signal Department specifications. The subsidiary cables for external connections are single core for the leads to rails and multi-core to the point machines and signals. Both are to British Railways Specification No. 972.

Relay rack wiring consists of 1/·044 copper conductors for signalling relays, and 1/·028 for telephone-type relays, p.v.c. insulated, to Western Region Signal Department specification. Air-conditioning plant is provided for the operating and relay rooms.

Main and stand-by power

The power rooms are in the basement. The main supply is taken from the local authority at 415V. 50 cycles. There is also a stand-by diesel set which cuts in automatically if the mains supply either fails completely or drops below a specified voltage.

For general distribution, including the two outlying relay rooms, the power is stepped up from 415 to 660V. to minimise transmission losses. For the main relay room it is then fed to the main signalling supply distribution switch panel which is housed in a room separate from the main power room but also in the basement of the main building. There it is stepped down to either 110V. a.c. or 50V. d.c. for the signalling relays, or 24V. a.c. for panel indications. In the basement there is also the main battery room containing the 110V. battery of low-loss type accumulators for operating points within the station area.

Duplicate transformers and rectifier sets are provided for all signalling power supplies feeding the relay room and panel, controlled by suitable switchgear.

The whole of the circuit design of the signalling and train describer equipment, relay room layouts and so on, were carried out to the requirements of Mr. A. A. Cardani, Signal Engineer, British Railways, Western Region, who was also responsible for the carrying out of the work on site.

The main cabling, the erection of signals, fitting of point machines and so on, was carried out by Western Region Signal Department staff.

The relay room and location wiring generally was carried out by the staff of M.L. Engineering (Plymouth) Limited, under the supervision of the Western Region Signal Department.

Principal contractors included the following:—

Point machines, signals, signalling relays, relay racks	Westinghouse Brake & Signal Co. Ltd.
Signalling panel, including train - describer panel	Henry Williams Limited (Integra)
Telephone - type relays, train - describer relay racks, and relay sets	M.L. Engineering (Plymouth) Limited
Telephone concentrator, including rack equipment for same and for signal post telephones	Telephone Manufacturing Co. Ltd.
Main switch panel ...	Ottermill Switchgear Limited
Signalling power supply distribution switch panel	Santon Limited
35 kVA. diesel set and associated equipment	Ruston & Hornsby Limited
Point-machine batteries	Chloride Electrical Storage Co. Ltd.
Main cable-jointing and potheading	British Insulated Callender's Cables Limited
Signal box including provision of warm-air filter unit	Dudley Coles Limited

*The directional significance of the display units in a two-way section applies to the entrance of descriptions only. The arrangement provided at Plymouth in the "two-way" platforms is capable of displaying the descriptions of four trains simultaneously if two have arrived in the up direction and two in the down. When a train leaves such a section the first description to the rear of the signal cleared for the train movement will step forward whether this description be exhibited in an "up" or a "down" display unit.

PERSONAL

Overseas

MR. W. T. MASTERSON, who, as reported in our issue of December 2, has been appointed Executive Vice-Chairman of the Rhodesia Railway Board, entered Rhodesia in May, 1936. He joined Southern Rhodesia Public Service in August, 1936, and in October the same year entered the Transport Section of the Southern Rhodesian Ministry of Mines and Public Works. He became Secretary of the Road Service Board in 1938. Mr. Masterson served from September, 1939, to September, 1945, in the Royal Rhodesia Regiment, seconded to the Royal West African Frontier Force, re-joined the Southern Rhodesia Ministry of Transport on demobilisation in 1945, and became personal assistant to the Southern Rhodesia Minister of Transport. He participated in work connected with the purchase of the Rhodesia Railways Limited, by the Southern Rhodesia Government, the subsequent establishment of the Rhodesia Railways as a statutory corporation and the purchase by the Portuguese Government of the Beira Railway. He was transferred, as Secretary, to the

Rhodesia Railways Higher Authority, to serve in the Federal Ministry of Transport in November, 1953, and left the service of the Federal Government in March, 1960, on appointment as Executive Vice-Chairman of the Rhodesia Railways Board, having been previously appointed a member of the Rhodesia Railways Board from May, 1959. He is an Associate Member of the Institute of Transport.

We regret to record the death, at the age of 90, of MR. W. A. VEITCH, who was Minister in Charge of the Railway System, Dominion of New Zealand, in 1930 and 1931. A Past President of the Amalgamated Society of Railway Servants, Mr. Veitch, was a native of Scotland, but lived practically the whole of his life in New Zealand.

We regret to record the death, on January 2 of MR. W. A. MATHER, Chairman of the Canadian Pacific Railway Company. He was born at Oshawa, Ontario, in September, 1885, and attended public and high school at Kenora, Ontario, before going to McGill University, where he graduated in 1908 with a Civil Engineering degree. While attending University, he worked with Canadian Pacific Railway during the summer months and it was this early experience which introduced him to railway operation. He became resident engineer at Winnipeg in 1910 and transferred from engineering to operating in 1912. From then until May, 1933, when he was appointed Assistant to the Vice-President of the company at Montreal, he served at Kenora as superintendent, as Assistant General Superintendent at Vancouver and as General Superintendent at Moose Jaw and Calgary. A year later he was made Assistant to the Vice-President, during part of which period he acted as General Manager of Eastern Lines. He was appointed General Manager of Western Lines with headquarters at Winnipeg in September, 1934. During his residence in Winnipeg, he was on the board of the Winnipeg General Hospital from 1942 to 1948, and the Knowles School for Boys, Winnipeg, from 1942 to 1948. He was Honorary President, Montreal Division, Navy League of Canada and Honorary Chairman, Canadian Paraplegic Association (Quebec Division). In June, 1951, Bishops University conferred upon him the honorary degree of Doctor of Civil Law, and in the following year he received from the University of Western Ontario the honorary degree of Doctor of Laws. He was an honorary member of The Engineering Institute of Canada, and was created a Knight of Grace of the Order of St. John of Jerusalem, in December, 1952. Before his election as the seventh President of the C.P.R. in March, 1948, he was Vice-President at Winnipeg for six years. His titles included D.Sc.(C.E.), LL.D., D.C.L., Hon. M.E.I.C. At the time of his death he was Chairman of Canadian Pacific Airlines Limited, and Canadian Pacific Steamships Limited, a director and member of the Executive Committee of Consolidated Mining & Smelting Co. of Canada Ltd., and a director of the Canadian Pacific Express Company, Scottish Trust Company (Toronto), Hamilton & Buffalo Railway Company, Canadian Marconi Company, West Kootenay Light & Power Co. Ltd. He was also on the Advisory Committee of Canadian Standards Association and a director of the Canadian Forestry Association.

MR. P. E. BRIDGES, Office Engineer, Chief Civil Engineer's Office, New Zealand Railways, has been appointed District Engineer, Wanganui. He succeeds his brother, MR. G. F. BRIDGES who, as reported in our issue of December 16, has been appointed Projects Engineer in the Civil Engineer's Office at Wellington.

MR. R. L. AMYOT, Catering Superintendent, Rhodesia Railways, who retired on December 31, joined the Rhodesia Railways in 1930, became Assistant Catering Super-

intendent some 19 years later, and was appointed Catering Superintendent in 1952.

While Mr. Amyot held office the department expanded considerably and the catering "branches" increased by more than 100 per cent, from 21 in 1952, to 43 today. The highlight of Mr. Amyot's career was the Royal tour of 1953 during which he arranged and supervised the entire catering programme for the Royal and pilot trains.

MR. G. F. SHINN, Assistant Catering Superintendent, Rhodesia Railways, who succeeds MR. R. L. AMYOT as Catering Superintendent, was born at Mount Selinda Mission in the Eastern Districts and is the son of a former Catering Superintendent of the Rhodesia Railways. Mr. Shinn was educated at Milton School, Bulawayo, and joined the Catering

Department as a junior clerk in 1929. During the war he served with the 1st. Battalion King's Royal Rifle Corps (60th Rifles) and saw action at Alamein. He was appointed bookkeeper in the Catering Department after demobilisation, acted as Manager of the Savoy Hotel, Beira, and was appointed to Assistant Catering Superintendent in 1953. Mr. Shinn has been closely associated with the Rhodesian Society for the care of the Blind & Physically Handicapped for a number of years.

New Year Honours

A further selection of interesting New Year Honours is :—

B.E.M.

MR. D. A. COLE, Foreman, Swindon Works, British Railways, Western Region.

MR. F. S. EVANS, Driver, Neath, British Railways, Western Region.

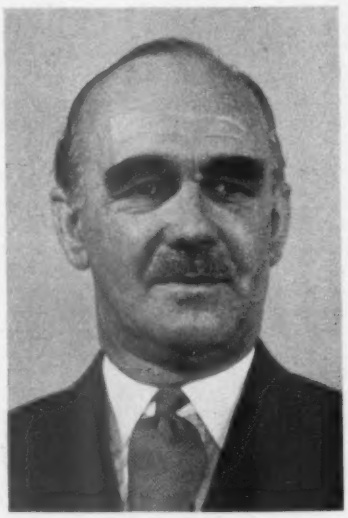
MR. J. W. S. PEGRUM, General Manager, Rhodesia Railways, who, as recorded in our January 6 issue, was awarded a C.M.G. in the New Year Honours List, was born in

1899, and joined Rhodesia Railways in 1925 after war service with the Royal Navy. In 1927 he was appointed Station Foreman at Amatongas, subsequently becoming Stationmaster at Dondo and, later, a Traffic Inspector, in which capacity he served at Broken Hill, Beira, and Bulawayo from 1933 to 1939. Mr. Pegrum became Stationmaster at Broken Hill and, in 1943, Stationmaster at Bulawayo. In 1945, he was appointed Assistant Operating Superintendent, Broken Hill, and, in 1948, District Superintendent. He became Deputy Chief Superintendent of Transportation in 1952 and Chief Superintendent in 1954. He was appointed Deputy General Manager in March, 1956. During the African Railway Workers' strike in 1956, he acted as General Manager, and was promoted to that position in August, 1957. He is to retire on January 15 as previously reported.

MR. CHARLES HOLT, Managing Director, Thos. Cook & Son Ltd., who, as recorded in our January 6 issue, was awarded a C.B.E. in the New Year Honours List, was born in September, 1899, and joined Cook's at the

age of 20, after serving in the 1914-18 war. His first appointment with the company was in the Rates Department and, within a few months, he was posted to Interlaken and then Naples, Lucerne, and Geneva. At the age of 23 he became Branch Manager at Luxor, working there during the winter and in Stresa during the summer. On returning to England in 1926, he opened the company's Sloane Street office, later taking over the City office and becoming Joint Traffic Manager in 1940. In this position he made it his business to know every member of the staff in the British Isles, visiting each office. His next appointment was that of Traffic Manager for the British Isles, and, in March, 1948, he was appointed Assistant General Manager (Administration), eight months before his appointment as Deputy General Manager. He was appointed Managing Director of the Cook Group of Companies in 1959. Mr. Holt was Chairman of the Creative Tourist Agents' Conference from 1949 to 1956.

MR. J. W. DEDMAN, Line Traffic Manager (London, Tilbury & Southend), British

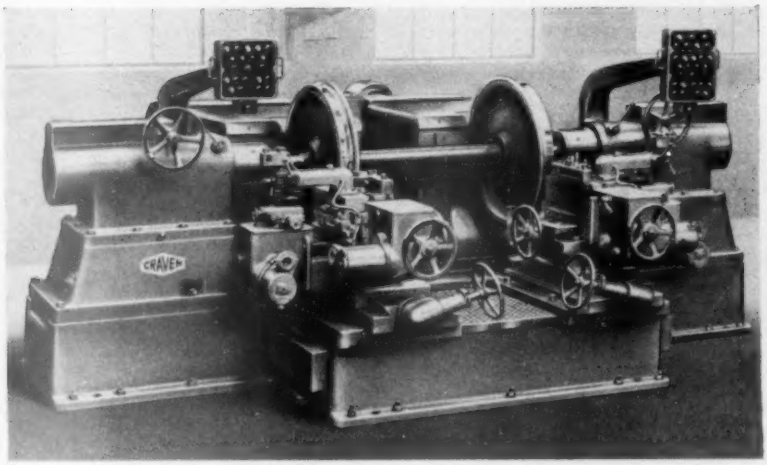


Railways, Eastern Region, was awarded the O.B.E. in the New Year Honours List, joined the North Eastern Railway in 1917 at Norton-on-Tees. After serving at various stations on Tees-side, he was transferred to the District Goods Manager's office, Middlesbrough, and, in turn, to the Goods Manager's office, York, and the Divisional General Manager's office, York, where he was Personal Clerk to the Divisional Manager from 1926 to 1928. Thereafter, Mr. Dedman was transferred to the Chief General Manager's office, Kings Cross. In 1930, he returned to the North Eastern Area working successively at York, Hull and Darlington, where he was Chief Clerk (Staff), from 1932 to 1937, in which year he became Assistant Goods Agent, Newcastle Forth. In the following year, he was appointed to the Superintendent's office, York, where he remained until 1942, when he took up the appointment of Assistant District Superintendent, Edinburgh. In 1946, Mr. Dedman was appointed Assistant District Superintendent, Glasgow, and in February, 1949, he became District Operating Superintendent, Southend District, Eastern Region. In April, 1950, he was appointed District Operating Superintendent, Cambridge, and in 1954, moved to Liverpool Street as Assistant Divisional Operating Superintendent (Western). He was appointed to his present position in 1956. Mr. Dedman is a past-Chairman of the Cambridgeshire, Bedfordshire & Huntingdonshire Section of the Institute of Transport and has lectured to railway students at Glasgow and Edinburgh Universities on railway operating. In 1955 he received a British Transport Commission Award for a paper presented to the Institute entitled " 1984."

Ministry of Transport

MR. ERNEST MARPLES, Minister of Transport, has announced that he has accepted with regret the resignation of MR. S. H. LEAKE, O.B.E., as a part-time Member of the London Transport Executive. Mr. Leake has served for nearly five years as a Member of the Executive and has resigned his appointment owing to the increasing demands of his personal interests.

NEW EQUIPMENT *and Processes*



TYRE-PROFILING MACHINE

The range of Craven railway wheel lathes has been extended to cover the re-turning by carbide cutting tools of skin-hardened wheel sets, with plain or roller journal bearing axleboxes in position. A pair of hydraulically-clamped friction rollers is used to drive the wheels and the tyre profiles of both wheels are re-machined simultaneously by automatic profiling equipment.

The wheel set is carried between revolving centres and the friction-drive rollers engage the wheel rim. The rollers are tapered and engage the wheel rim at an angle, each pair being mounted in independent and opposed sliding blocks. These are hydraulically operated to provide a fully balanced, self-contained thrust of sufficient pressure to transmit the required driving torque. The range of adjustment provided enables wheels of varying width to be accommodated. The hydraulic supply for operating the roller grip is by a motor-driven dual pump unit. After the driving grip has been applied, the driving pressure is maintained during machining by operation of one pump only.

The drive is by a 48-h.p. motor through a three-speed gearbox, giving an infinitely-variable range of cutting speeds between 50 and 160 ft. per min. The two separate friction-roller-drive saddles, which are clearly visible from the side in the left-hand illustration below, advance in unison to the driving position, at which point they are electrically-tripped to maintain the correct relationship between the driving rollers and the tread.

Each tool-rest is equipped with the Craven patent electrically-operated profile copying equipment, which controls automatically the re-machining of each tyre. The tool slides are set to the correct gauge and have transverse adjustment, to setting gauges, for accommodating the various wheel diameters. Hand adjustment, power feed, and quick power traverse are provided in both the longitudinal and transverse directions on each tool slide. Separate variable-speed motors provide the power feed longitudinally and transversely. When profiling, these motors are automatically controlled by a tracer head stylus applied to a template. One of the tracing mechanisms can be seen below the nearest of the two control panels in the right-hand illustration.

This type of machine will accommodate any gauge, and wheels of from 30 in. to 48 in. or 36 in. to 60 in. dia. in all types of tyre profile. On the machine illustrated loading is by overhead lifting equipment. If required the machine can be arranged for rolling the wheel set into position and raising to centre height by a built-in jack.

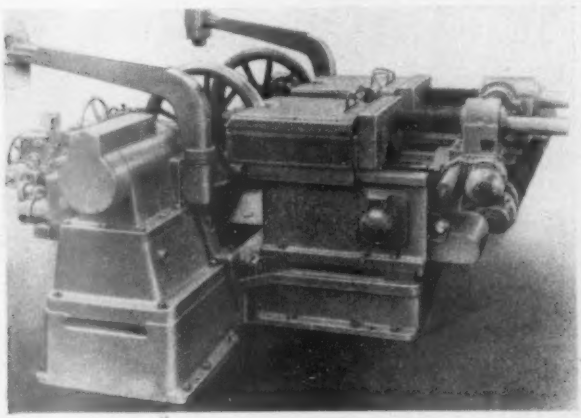
Further details may be obtained from the manufacturer, Craven Bros. (Manchester) Ltd., Vauxhall Works, Reddish, Stockport.

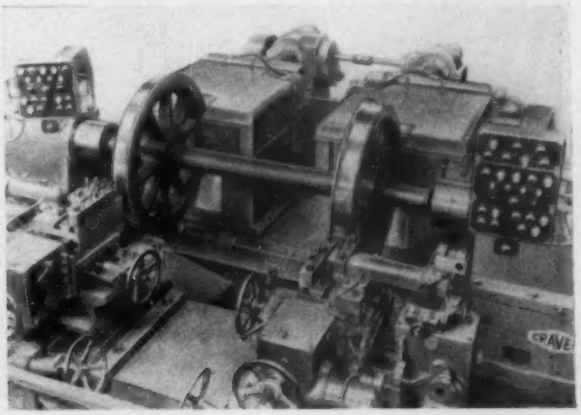
PROTECTED METAL SHEETING

Robertson Colour Galbestos protected metal sheeting, which has been marketed in a variety of bright colours in Britain for about 12 months as a cladding for buildings, is to be made available also in slate black.

This material is claimed to possess the advantages offered previously by bitumen-coated Galbestos, known as G.P.M., which has been withdrawn from production. At the same time it shows a considerable advance in fire performance. Colour Galbestos is plastic-coated sheet steel and cannot drip during a fire.

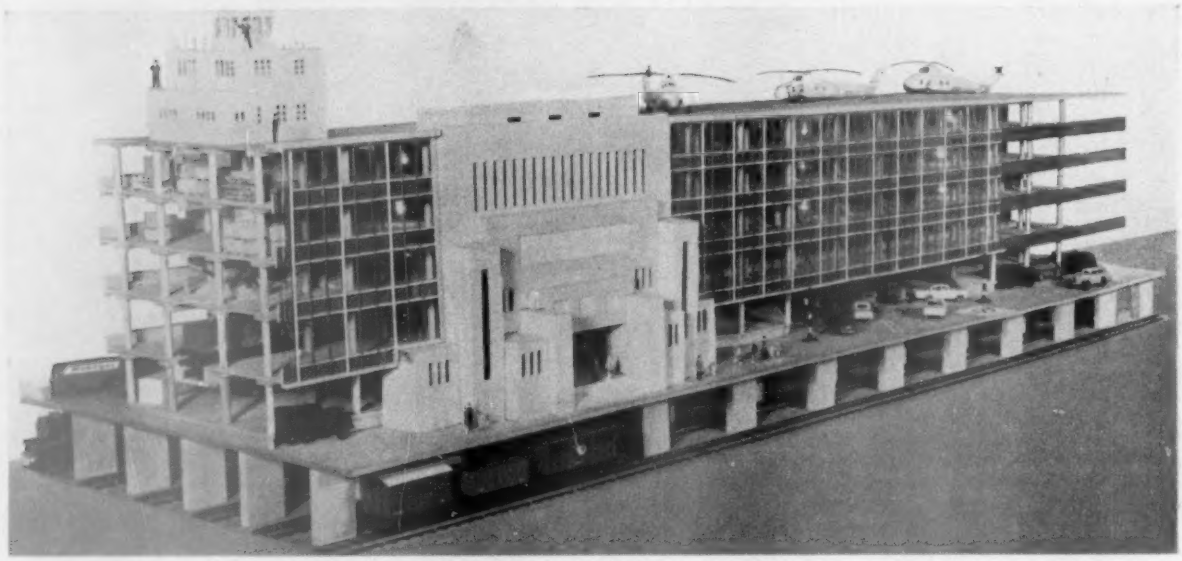
Further details may be obtained from Robertson Thain Limited, Ellesmere Port, Wirral, Cheshire.





Proposed Re-siting of Covent Garden Market

Plan for market building to be built over sidings at Kings Cross Station



Model of proposed market building, showing rail access to Kings Cross passenger station below, and heliport on roof

At a press conference at St. Ermins Hotel, London, S.W.1., on January 4, presided over by Lord Sempill, a director of Central Airports Limited which is associated with the Industrial Development Group Limited, details were given of an alternative proposal to the Runciman Committee report on the reorganisation of Covent Garden Market on its present site, by Mr. C. W. Glover of C. W. Glover & Partners, consulting engineers and architects.

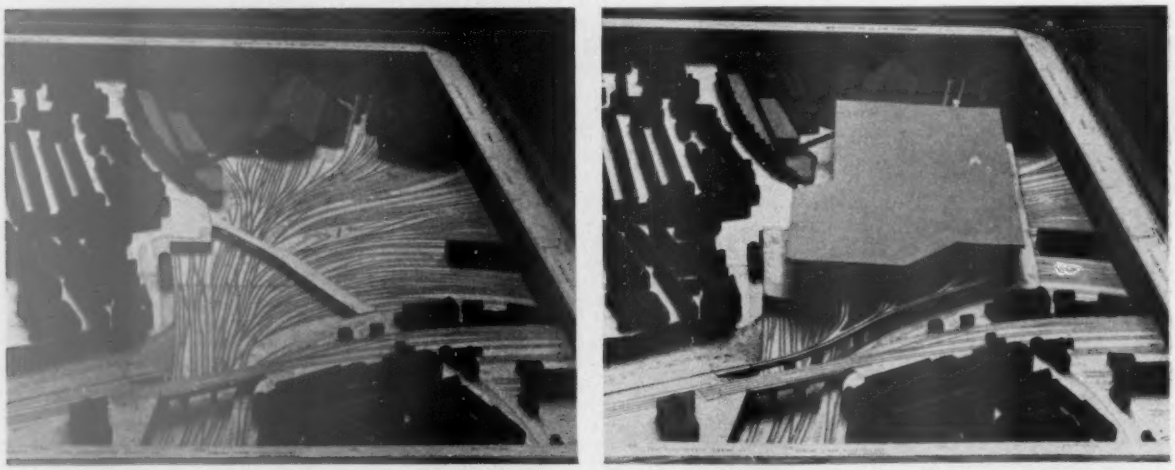
At present Covent Garden Market is spread over 38 acres, and covers 99 acres occupying 10 miles of kerb-side with its activities. Traffic congestion prevents immediate loading and unloading, the delay often resulting in loss of perishable goods. Rail and water supplies arriving by road involve the double handling of these goods. It is estimated that 1,500 porters are used to manhandle these goods to and from vehicles, their labour adding to the cost.

Runciman Committee report

Briefly, the Runciman Committee report proposes the building of a market "annex" for bulk supply and empties on a five-acre site at Finsbury, and the concentration of the present market buildings to new ones on the site. The cost is estimated at £7 million.

The cost of C. W. Glover & Partners' plan would be some £6 million. It is proposed that the British Transport Commission be paid up to £100,000 a year ground rent for a 99 yr. lease of the site above the fan of railway sidings north of Kings Cross. On this site a new market would be built on a concrete platform above the sidings. This could be built without interfering with the running of the sidings. The Covent Garden Market site would then be available for development. The area being suitable for office blocks or flats.

The advantages of the Kings Cross site are stated to be numerous. Floor space at



Left : model of goods siding on the approach to Kings Cross Station, British Railways, Eastern Region and, right ; model of Covent Garden Market building showing high-level rail approach

Covent Garden is approximately 23s. per sq. ft.; at the new site, even making an allowance for ground rent, it would be reduced to 14s. per sq. ft. Whilst the efficient handling of any market is dominated by its goods handling ability, the new plant would involve mechanisation. This would cut labour costs.

The market building would be five storeys high, built over the roadway, the railway running in on the first floor from an existing high level line, the second floor would be used for display and sale purposes, and the remaining two floors for storage. This will comprise 1,105,600 sq. ft., display and sales floor area 434,720 sq. ft., and handling floor space 567,120 sq. ft., representing gross floor area of 2,107,440 sq. ft.

The marketing centre would have a flat roof with an area of some 960,000 sq. ft., which would lend itself as a heliport.

The new building has been designed to permit the easiest and quickest possible transfer of the goods from bulk supply to store, display and retail dispatch thus reducing handling costs to a minimum.

Present handling capacity at Covent Garden is 500 tons per hour. This would be increased to 5,000 tons per hour at the Kings Cross site.

Vehicle accommodation

Reserved space would be available for every vehicle by the loading platform. Vehicles at the market would be accommodated off the present road system, and would be able to get clear of the area before peak traffic hours. Standings for 716 vans or 358 articulated lorries would be provided, as well as space for 568 cars.

Loading and unloading on either side of the vehicle would be done by fork-lift trucks. There would be scope for the extensive use of pallets.

Apart from road, rail and air transport available at the Kings Cross site there is also the neighbouring Grand Union Canal.

This scheme is a private enterprise which would not call upon public funds; indeed, the British Transport Commission would benefit by the ground rent of £100,000 a year.

Re-signalling at Newport, Western Region

Work on the complete re-signalling and improvements to the track layout at Newport, Mon., one of the major schemes at present being undertaken by the Western Region of British Railways, as part of the modernisation plan, is proceeding rapidly, and is keeping pace with the construction of the Richard Thomas & Baldwin Limited new steelworks at Llanwern. It is intended that the first stage of the improvements should be completed in time to handle the increased traffic anticipated when the new works begin production and also that from other industrial developments in South Wales.

Colour-light signalling

The principal feature of the scheme is the replacement of the existing signalling system by a multiple-aspect colour-light installation, operated from a central signalbox at the east end of the station. This will take over the work of 15 existing boxes which are to be demolished.

The installation will contain a control panel on which will be automatically indicated the position of every train between Marshfield to the west and Llantarnam and Bishton to the north and east, and the most modern methods possible in electrical signalling will control all train movements in that area.

New mechanical-frame signalboxes will be built at East Usk Junction to control the sidings and branch points and signals in that area, and at Waterloo Loop to operate sidings and Dock line connections on the down side of the line. Another important feature, involving a considerable amount of engineering work, is the radical re-arrangement of the running lines through Newport Station and simplification of the track layout in the area.

Simplification of track layout

At present, the up and down goods lines east of Newport are on each side of the up and down main lines, whereas west of Newport they are both south of the main lines and the plans provide for both goods lines to be re-sited on the south side of the main lines throughout with the provision of a fourth line between Maindee Junction East and Newport East. This will have the effect of eliminating delays caused by freight trains crossing the main lines, as it will be possible for these trains to run direct from Cardiff, through Newport, and on to the new steel works at Llanwern, and beyond, without interfering with traffic on the main lines. A new flyover bridge at Bishton, which is also part of the scheme, will then allow freight trains to pass over the main lines to rejoin the up goods line which is to remain on the north side from this point because the up marshalling yard at Severn Tunnel Junction is situated on the north side of the tracks. Further improvements in running will result from the conversion of these goods lines into relief lines, thus allowing the maximum speed of trains over them to be increased from 10 m.p.h. to 40 m.p.h.

Provision is made for the installation of new running junctions at Gaer Junction, Ebbw Junction, and St. Brides (near Marshfield) to enable trains to cross between the main and relief lines at fast speeds. Junctions at Magor, East Usk, and Maindee Triangle will also be re-sited to permit faster running.

Re-arrangement of the track layout will necessitate changes in the present working of passenger trains using Newport Station. Most important of these will be the adapting of the present up main line platform for use also by west-bound trains. This platform will then be used by these trains with east-bound using the present up and down relief platforms. When summer holiday traffic is at its peak, it will be possible, if necessary, to divert down trains to the existing down main line platform.

Lifting barrier installation in the Western Region

British Railways, Western Region, has replaced the level crossing gates at Long Rock, between Marazion and Penzance, by electrically-operated lifting barriers. Controlled by the signalman in the adjacent Long Rock Signalbox, the barriers will be interlocked in such a way that the railway signals cannot be cleared for the passage of a train until the barriers are horizontal, closing the road. Similarly, they cannot be raised until the railway signals are at danger.

The barriers are controlled from a switch panel, mounted on a pedestal. This is near the signalbox window, allowing the signalman an unobstructed view of the crossing. A two-position rotary switch turned to "raise" or "lower" and the depression of a push button marked "operate," will set the barriers in motion in the required direction. An indicator on the control panel will show the up or down position of the barriers.

The barriers, which take approximately 9 sec. to raise or lower, are 23 ft. 6 in. long and have wooden booms painted in red and white bands 2 ft. wide. A 1-in. strip of red retro-reflecting materials is placed lengthways on the red portions of the boom, and this, together with a retro-reflecting red target which is fitted on each barrier, will reflect light from approaching vehicle headlamps, making the barriers conspicuous after dark. There are two electric lamps on each barrier, shining red in both directions along the road, which are illuminated as soon as the barriers have been lowered and remain alight while they are down and until they again reach the raised position.

A light-weight aluminium-alloy skirt is fitted under each boom. This is painted red and white to correspond with the 2-ft. wide bands on the boom. The barriers were designed by the Western Region Signal Engineer's staff at Reading to comply with the Ministry of Transport requirements and were manufactured at British Railways Reading Works.

English Electric gas-turbine locomotive

A 2,700-h.p. experimental gas-turbine locomotive, "GT3," designed and built as a private venture by the English Electric Co. Ltd., has been completed at Vulcan Foundry Limited, Newton-le-Willows. It started its trials on the London Midland Region of British Railways on January 8. It will enter revenue service later in the year. Brief reference to this locomotive was made in our issue of June 10, 1960.

The prototype, which is the product of successful bench and track tests at the British Transport Commission test station at Rugby, is not unlike a conventional steam locomotive in appearance. The unit consists of locomotive and tender, with a 4-6-0 wheel arrangement and a driving wheel diameter of 5 ft. 9 in. It is finished in light brown, with dark green frames and wheels, and is lined with dark green and orange bands.

Power is drawn from an English Electric "EM27L" gas turbine, designed and built at the company's Whetstone works in Leicestershire, which has been specially developed for direct mechanical drive, with a separate power turbine. A simple reverse and reduction gear-box is employed. With a full tender, 2,000 gal. of gas-oil fuel and 1,750 gal. of water as well as train heating equipment (a total load of over 15 tons), the complete locomotive weighs 123 tons and the overall length is 68 ft.

The English Electric unit is the third gas turbine locomotive to run on British Railways and is expected to give valuable operating experience with this comparatively new form of motive power.

Delivery of Diesel Locomotives to C.I.E.

Mr. F. Lemass, General Manager, Coros Iompair Eireann, on the results of the modernisation programme

As reported in last week's issue, the first two diesel-electric locomotives from an order of 15 950-h.p. locomotives placed by Coras Iompair Eireann with the General Motors Corporation of the United States last July arrived in Dublin last week. Following an inspection of the locomotives by Mr. E. H. Childers, the Minister for Transport & Power, guests were welcomed to luncheon at the Hibernian Hotel, Dublin, by F. Lemass, General Manager, C.I.E. He said that the new Board of C.I.E. was now a little over two years in office and the results of their modernisation programme were already becoming apparent. But the Board's duty did not end with its efforts to bring the company up to date. C.I.E.'s long-term task was to plan for the future; to estimate public transport needs, five, 10, 20 years hence, and to make plans today to serve those needs in the future.

A new development department was being set up. Part of its task would be to study the trends in traffic and plan future development accordingly. This in itself was a task of some magnitude when one considered the scope of the undertaking. At present C.I.E. gave an overnight service of goods to the principal centres throughout the country. To most people, C.I.E. represented, on the railway side, simply passenger trains plying by day, but the fact was that C.I.E. rails were busiest at night time. It was when the last passenger train had reached its destination that goods traffic on the railways began to build to its peak. Throughout each night C.I.E. carried roughly 7,500 tons of merchandise, freight of all kinds, throughout the breadth of the land. This required detailed organisation and planning.

Mr. Lemass stressed that the efficiency of the railways tended to be judged primarily by the service provided for passengers. They had a right to expect the maximum comfort and, above all, reliability in the service provided. He pointed out that the company was very conscious of its obligations in this matter. The new locomotives would help to improve C.I.E. service. The two diesel locomotives which the Minister had inspected were the first delivery of 15 locomotives which were being supplied to C.I.E. by General Motors. They were of 950 h.p. and are capable of a speed of 77 m.p.h. They were dual purpose and could be used for both passenger and freight services.

In addition C.I.E. had on order 14 sets of power equipment from Maybach Motorenbau, for use in 400-h.p. diesel-hydraulic locomotives which were to be built at the C.I.E. Works, Inchicore. They would have a maximum speed of 45 m.p.h. and would be used on freight and branch line services.

Finally, he referred to a contract placed with another German firm, Klockner Humboldt Deutz, for seven diesel-hydraulic locomotives of 160 h.p. with a maximum speed of 25 m.p.h., to be used for shunting purposes. When these 36 locomotives had been integrated this year into the present fleet, 92 per cent of all C.I.E. trains, both passenger and freight, would be operated by diesel traction.

Mr. Lemass emphasised the fact that C.I.E. meant the national transport company—not merely a rail service or a road service but a complete, flexible transport undertaking. The primary and paramount duty of the organisation was to supply a public service that was satisfactory and efficient. All the board's endeavours were devoted to the task of improving that service. He then listed a number of projects in hand. These improvements, he said, would all be achieved as soon as possible. Their achievement called for a major effort on the part of the staff at all levels, which he was satisfied would be forthcoming. They were an instance of the company's determination to raise the standards of all services so that they would, in the foreseeable future, provide transport facilities of which the C.I.E. and the entire nation might be justly proud.

Parliamentary Notes

Forthcoming questions of railways

Notice has been given of ten questions about railways to the Minister of Transport for answer in the House of Commons after the re-assembly of Parliament on January 24.

Mr. Leslie Spriggs (St. Helens—Lab.) will ask the Postmaster General on January 24, whether there was a limit to the quantity of mail put in mail bags; what instructions were given to the Post Office staff for loading it; and whether loaded mail bags were checked for weight.

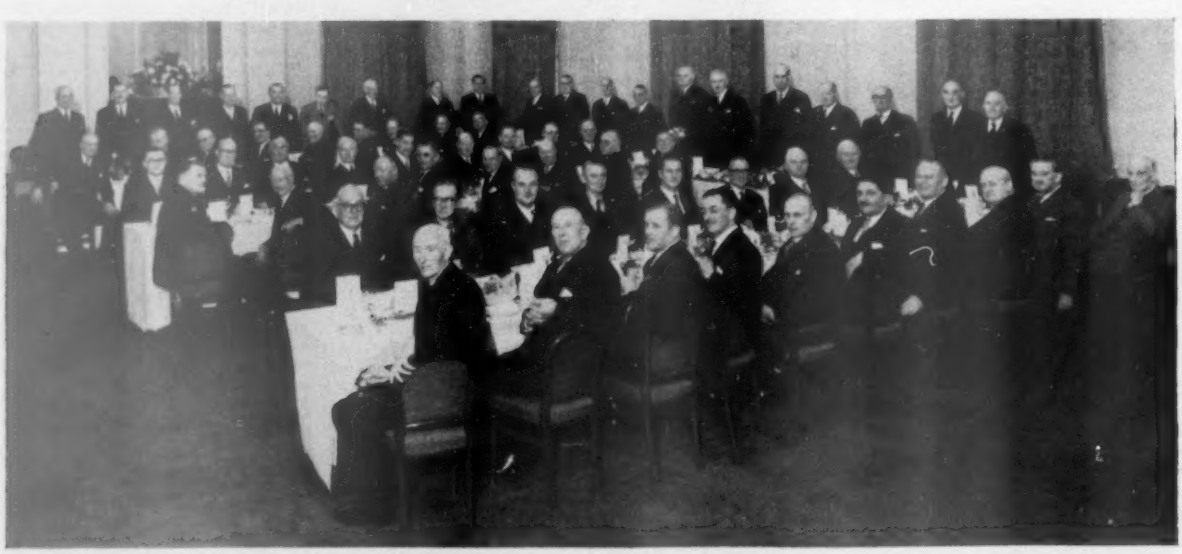
New Stations, Fares and Pensions

Mr. L. Spriggs (St. Helens—Lab.) will ask on January 25, whether organisations have requested that the Stedeford Committee report will be made public, and if a statement will be made.

Lt.-Colonel Bromley-Davenport (Knutsford—C.) will ask on January 25, what capital expenditure was authorised to build railway stations during the last five years.

Mr. Spriggs will ask on January 24, for a general direction to the British Transport

WESTERN REGION CHIEF OFFICERS CHRISTMAS LUNCHEON



Mr. J. R. Hammond, General Manager, British Railways, Western Region, presiding at the annual luncheon of past and present officers and directors at Paddington on December 19

Commission to retain cheap early morning fares on all forms of public transport for which it is responsible where stage fares exist at the present time; and for the Traffic Commissioners to be instructed to refuse applications to raise early morning fares on public service vehicles.

Mr. Simon Wingfield Digby (West Dorset—Lab.) will ask on January 25 for a general direction to the British Transport Commission to consult the Forestry Commission on the availability of home-grown supplies before placing large orders for imported timber either directly or through contractors.

Mr. J. Watts (Moss Side, Manchester) will ask for the introduction of legislation to increase superannuation allowances to retired members of the clerical and supervisory staff of British Railways by the same method as that operated for other servants under the Pensions (Increase) Acts.

Implementing Railway Reports

Miss Harvie Anderson (East Renfrewshire—C.) will ask on January 25, for a statement on the inquiry into the failure of the newly-electrified line round Glasgow.

Mr. Noel-Baker (Swindon—Lab.) will ask on January 25, for information regarding the steps being taken to implement the proposals of the Select Committee on Nationalised Industries that the uneconomic services on British Railways be financed out of public funds.

Mr. Noel-Baker also will ask on the same day, in what way the British Railways Executives, which were established under Command Paper No. 1248, will differ from former railway executives abolished in 1953; what measures are in mind to ensure close co-operation between the Board and other nationalised transport undertakings, and what control it is proposed to give to Parliament over the Board's work.

Mr. Noel-Baker will ask the Chancellor of the Exchequer on January 26, whether he has yet decided when he will publish the White Paper on Public Investment in Private Industry to supplement the information given in Command Paper No. 1203.

Mr. Noel-Baker also will ask the Chancellor on January 26 how he proposes to implement the financial policies outlined in Command Paper No. 124, particularly those affecting British Railways.

Mr. Denzil Freeth (Basingstoke—C.) will ask the Minister of Transport on February 1, what plans he has for strengthening the Tothall Bridge, A34, over the railway line at Burghclere, Hants.

Mr. Hector Hughes (Aberdeen N.—Lab.) will ask how far the capital development plans for British Railways electrification in Scotland have been developed and extended during the last six months, and if he will specify the districts affected by the project.

Questions in Parliament

Future electrification plans

The Minister of Transport answered numerous questions about electrification on December 21.

Lt.-Colonel Bromley-Davenport (Knutsford—Cons.) asked him how many electric rail services under the capital development programme were to be opened shortly.

Mr. Marples replied that three electrification schemes were planned for completion in 1961—those of the London, Tilbury & Southend line and of extensions to the Southern Region Kent Coast and Scottish Region Glasgow schemes.

In answer to Mr. G. R. Strauss (Vauxhall—Lab.), Mr. Marples said that the revised estimates for the completion of the London to Crewe electrification had been received by him and that he hoped to make a fairly early announcement on the subject.

Mr. E. C. Redhead (West Walthamstow—Lab.) asked what proposals the Minister had received regarding changes in the capital allocation for electrification.

Mr. Marples said it was necessary to establish the Commission's provisional investment allocation for 1961 before a detailed programme for that year was available.

Mr. Redhead suggested that the Minister should widen the enquiry into the failure at Glasgow to include the similar experience on the Eastern Region which made it necessary for British Railways to announce the return of engines to the English Electric Co. Ltd. for rectification of a serious fault.

Mr. Marples explained the problems were not similar as the reason for the failure in Glasgow has not been established. In the Eastern Region it was thought the fault had been found.

Electrification expenditure

Mr. John Mackie (Enfield N.—Lab.) asked what capital expenditure had been authorised for further electrification of the railways.

Mr. Marples replied that no specific authorisation of capital expenditure had been made for other than those schemes already in hand. Schemes included in the Commission's 1961 programme were being considered in the context of the four-year programme recently submitted to him.

Mr. Mackie drew the Minister's attention to conditions on the North London line stating that there had been more breakdowns on this than on the Glasgow line.

Mr. Marples expressed a desire to get the electrification right and hoped that the recent technical failure would be only temporary. It was one of the reasons for pausing and reassessing British Railways modernisation programme.

Delay in issue of White Paper

Mr. Francis Noel-Baker (Swindon—Lab.) asked when the final version of the Government White Paper on the future of the British Transport Commission reached Her Majesty's Stationery Office for printing.

Mr. Marples: at 6 p.m. on Wednesday, December 14.

Mr. Noel Baker said we still did not know what was to happen to the modernisation programme. The way in which the document was produced was highly unsatisfactory. Why did not the Minister make a statement in the House before the White Paper was issued and why was the House not given an opportunity to discuss it before the Recess ?

Mr. Marples replied that the point was to give the general public and the Opposition a chance to study the document before having a debate.

Mr. R. J. Mellish (Bermondsey—Lab.) asked him if he would change his mind about publishing the Stedeford Committee Report.

Mr. Marples felt that, because when evidence was being given it was stated that the Report would not be published, it would be a breach of confidence to publish it now.

Stedeford proposals

Mr. Strauss asked when the Minister proposed to introduce legislation to give effect to the administrative and financial proposals arising from H.M. Government's consideration of the Stedeford Report.

Mr. Marples referred him to paragraph 61 of the White Paper.

Mr. Strauss pointed out that if the proposals were not dealt with in this Session there would be a two-year delay creating confusion and uncertainty among those running the industry.

Mr. Marples pointed out that, while legislation would be required for many of the proposals, much of the reorganisation could be carried out by the Commission under its present statutory duties.

Staff & Labour Matters

Government White Paper

The leaders of the Trade Unions associated with the National Transport Industries, agreed at a meeting on January 5 that the Ministry of Transport should be asked to meet representatives of the T.U.C. so that they could obtain more detailed information from him on the implications of the Government's White Paper.

The Union representatives, while recognising that the White Paper makes some useful proposals and foreshadows some relief from the heavy financial burdens the railways have been carrying, feel that the policies on which the White Paper is based are not likely to produce a properly integrated transport system.

The White Paper was criticised on the grounds that many of the financial details are obscure, and that the suggestions for the new structure to replace the British Transport Commission contain ambiguities and lack of definition, particularly regarding the powers of control to be exercised by the Minister of Transport. Nor, it was complained, does the White Paper mention such matters of special concern to trade unionists as wage negotiating machinery and arrangements for superannuation.

HOLMAN GROUP AGENCY

The Holman Group of Camborne, Cornwall, opened new offices and a showroom at 8, King Street, Bristol, on January 2, to serve an area comprising Gloucestershire (East of the River Severn), Wiltshire, Somerset, Dorset and Devon. This is the seventh branch office of the group in Great Britain. The Branch Manager is Mr. J. C. Holman who has been transferred from the Welsh Office where he was lately responsible for the Swansea sub-area. The Technical Representatives are Mr. J. McBride Fletcher, responsible for Holman and Climax products, Mr. L. J. Gulliford who represents Maxam Power Limited, and Mr. J. Benny who will continue to operate from Camborne. The Service Engineer is Mr. H. Travis. The new office will deal with every product of the Holman group.

CONTRACTS AND TENDERS

Light-weight stock for the Toronto Transit Commission

The Toronto Transit Commission has awarded a contract for 36 light-weight subway cars for the University section of the Bloor-Danforth-University Subway to Montreal Locomotive Works Limited, Montreal, Canada, at a cost of $3,968,264. The tender submitted by the Montreal firm was the lowest of the 10 received from companies in Canada, Britain, United States, Japan and West Germany. The new subway cars, the first to be built in Canada, will be 74 ft. long, 17 ft. longer than the cars now in operation on the T.T.C. Yonge Subway. Tenders on the larger cars were permitted as an alternative under the T.T.C bid specifications. Acceptance of the 74 ft. cars by the Commission resulted in net capital saving of $580,000 on the cars required for the first stage of the project after allowance for changes to the present subway structure to accommodate the big cars. In addition there will be substantial savings in operating and maintenance cost. Delivery is scheduled to begin in September, 1962 and to be completed in January, 1963.

British Railways, Western Region, has placed the following contracts:

Standard Telephones & Cables Limited: supply and installation of a 12-channel carrier system between Paddington and Reading

Permutit Co. Ltd.: supply, delivery, supervision of erection and commissioning of a water softening plant at Bristol Bath Road diesel maintenance depot

Wilson Lovatt & Sons Ltd.: renewal of fenders and walings at Fishguard Harbour

Automatic Telephone & Electric Co. Ltd.: provision and installation of private automatic telephone exchanges at Southall, West Drayton, Slough and Maidenhead Stations

Vic Hallam Limited: provision and erection of the superstructure of a new signalbox at Shiplake

Fairfield Shipbuilding & Engineering Co. Ltd.: erection of new steelwork for the extension of the roof over the up relief and bay platforms at Slough

W. & A. Davies Limited: construction of a building for staff accommodation at Waunllwydd North, Ebbw Vale, Mon.

Anglo-Scottish Construction Co. Ltd.: completion of station buildings at Northolt, South Ruislip, Ruislip Gardens, and West Ruislip

Gunac Limited: repairs to concrete beams, copings, columns and other concrete surfaces at Warehouses Nos. 1 and 2, South Lambeth Goods Depot

Reed Crane & Hoist Co. Ltd.: supply, delivery and erection of one 10-cwt. electric goods lift and of structural steelwork for a 10½-ton electric hoist at No. 3 shaft, Severn Tunnel pumping station, Sudbrook

Lilleshall Co. Ltd.: supply of steelwork for the renewal of five (four leaf) lift bridges in the Goods Depot, Paddington

Norwest Construction Co. Ltd.: reconstruction and widening of the bridge over the line at Ellesmere

Industrial Painting Contractors (Winchester) Limited: brush painting (external and internal) the passenger station buildings at Cheltenham Lansdown

Keith Blackman Limited: supply, delivery and erection of dust extraction plant at "J" shop, locomotive works, Swindon

Joseph Westwood & Co. Ltd.: supply of steelwork for the extension of the station subway under the down loop line at Reading

J. & P. Zammit Limited: construction of accommodation for outdoor mechanical staff, Chief Mechanical & Electrical Engineer's Department, Swansea High Street

W. H. Heywood & Co. Ltd.: insulation of the Road Motor Engineer's Depot at West Street, Bristol

J. Rata & Co. Ltd.: carrying out repairs to bridges at Aynho, Banbury, and Cropredy

British Insulated Callender's Cables Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities at Margam Marshalling Yard, Port Talbot

Devon Electric & General Service Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities at Road Motor Engineer's Depot, Plymouth

Hartley Installation Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities at station, running & maintenance depot, goods depot and yard, Machynlleth

Winstanley & Lambert Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities, at Exchange Station, sidings and District Engineer's Depot, Wrexham

Hickmans Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities, at stations and goods yard, Keynsham & Somerdale

Hartley Installations Limited: supply, installation, testing, connecting and setting to work of electric lighting facilities at Shrewsbury Crewe Bank.

British Railways, North Eastern Region, has placed the following contracts:—

Samuel Butler & Co. (1960) Ltd.: replacement of girder span of bridge No. 20 Ardsley, carrying the Ings Junction to Leeds Central branch line over the Leeds-Huddersfield line

James Scott & Co. Ltd.: electrical installation works in the yardmaster's block at Newport new marshalling yard

Wm. Elliott & Son (York) Ltd.: filling in of arches of Chevet Viaduct, Cold Hiendley, nr. Wakefield on the Leeds-Sheffield line

Wellerman Bros. Ltd.: driving of sheet piling at Naburn Swing Bridge

F. & J. Watkinson: modernisation of general and ladies' waiting rooms and ladies' toilets at Bradford Exchange Station

Robert Jenkins & Co. Ltd.: supply of four 1,500-gal. and four 250-gal. oil storage tanks for York Motive Power Depot

Holmpress Piles Limited: piling work to control buildings site at Newport new marshalling yard

F. Shepherd & Son Ltd.: building of diesel stores block at York Motive Power Depot

Durham Steelwork Limited: supply and delivery of steelwork for the reconstruction of superstructure of bridge No. 23, carrying the railway over the road at Byker on the Newcastle-Tynemouth Riverside line

Herbert Morris Limited: supply of a 20-ton electrically operated overhead travelling crane with six-ton auxiliary hoist complete with gantry at Newport new marshalling yard

Mitchell Construction Co. Ltd.: demolition of Smithy Lane bridge, station footbridge and station buildings at Lamesley

R. Blackett & Son Ltd.: repairs to coal cells at Yarm coal depot

Consolidated Pneumatic Tool Co. Ltd.: supply of two air compressors for the Chief Civil Engineer's Department.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Malaya:

15,500 thermit rail welding portions for 60-lb. O.S. flat bottom rails.

The issuing authority is the Malayan Railway, Kuala Lumpur, to whom bids should be sent. The closing date is January 16, 1961. The Board of Trade reference is ESB/260/61.

From Iraq:

Construction of bridges and culverts on the Baghdad-Mussayeb standard-gauge line.

The issuing authority is the Director-General, Iraqi Republican Railways, Ministry of Communications, Baghdad, to whom bids should be sent. The tender No. is 5. The closing date is February 5, 1961. The Board of Trade reference is ESB/34316/60.

From Egypt:

Supply of electric materials.

The issuing authority is Purchases & Stores Department, Egyptian Republic Railways, Railway Buildings, Shoubra Subway, Cairo, to whom bids should be sent. The tender No. is E.R.344.G.8/112. The closing date is January 28, 1961. The Board of Trade reference is ESB/34123/60.

No further information is available at the B.O.T.

From India:

2 electrically driven centrifugal pumping sets each delivery 7,000 gal. of water per hr. as per specification.

The issuing authority is the Controller of Stores, Western Railway, Churchgate Station Building, Bombay-1, to whom bids should be sent. The tender No. is S438/64/2/162 (OW/3-59). The closing date is February 1, 1961. The Board of Trade reference is ESB/33900/60.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Change of name. The Siemens & General Electric Railway Signal Co. Ltd., has changed its name to S.G.E. Signals Limited.

The Plessey Co. Ltd. long service bonus. More than £55,400 in long-service bonuses is being distributed this year to 3,250 hourly-paid employees of Plessey Co. Ltd. with over five years' service. Some 250 of the employees have been with the company longer than 20 years.

Sunday train alterations at Falkirk.—Because of engineering work all trains to and from Falkirk on January 15 and 22, will arrive at and depart from Falkirk High instead of Falkirk Grahamston station.

Course on industrial and factory law.—A two-day course of lectures on industrial and factory law, designed for industrial managers and executives, and including the latest legislative changes, will be given by Mr. Harry Samuels at the Industrial Welfare Society headquarters February 6-8. Particulars can be obtained from the Industrial Welfare Society, 48, Bryanston Square, London, W.1.

Launching of Tilbury-Gravesend ferry boat. British Railways, Eastern Region, has announced that the last of three new vessels for the Tilbury-Gravesend passenger ferry service—ml. "Rose"—will be launched at J.S. Whites Shipyard, Southampton, on January 19, 1961. Miss Elizabeth Ann Johnson, daughter of Mr. H. C. Johnson, General Manager, Eastern Region, will perform the naming ceremony.

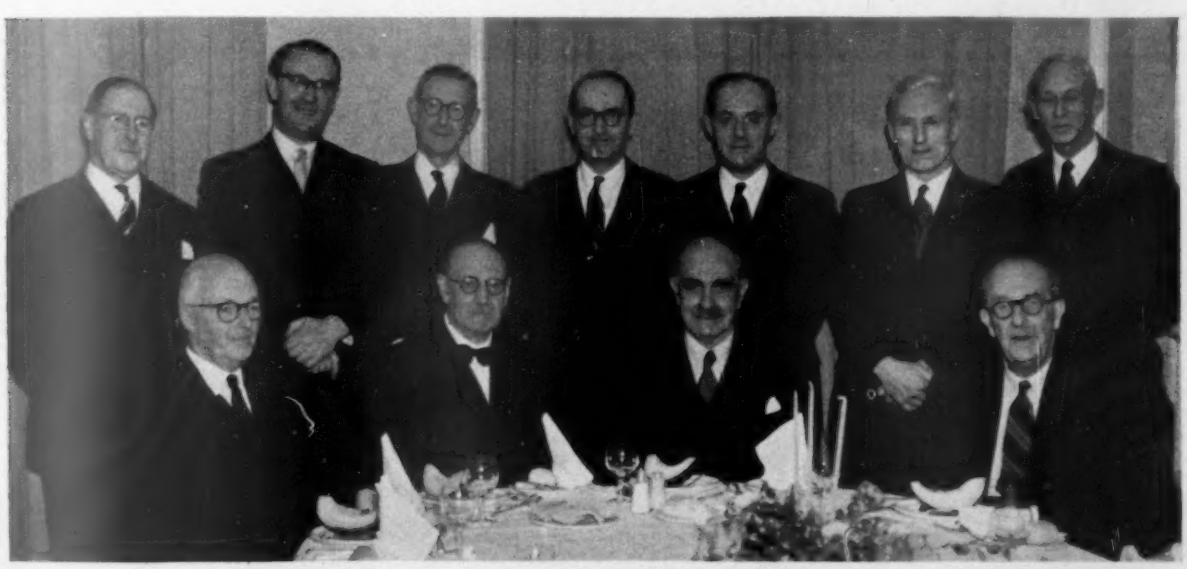
New plastics division formed by English Electric. A new Reinforced Plastics Division has been formed by the English Electric Co. Ltd. Its address is the English Electric Co. Ltd., Reinforced Plastics Division, Freckleton Works, Mill Lane, Warton, Lancs., tel.: Freckleton 521. The reinforced plastics work of the English Electric group of companies will now be centred at the new Freckleton Works, Warton. The range of manufacture covers aircraft, traction and rolling stock components previously made at the company's Preston Works as well as numerous other items from various small manufacturing units which have been operating in the group.

Special car/sleeper train for salesmen.—A special train, with sleeping accommodation, left Euston for Glasgow at 9.40 p.m. on January 9, conveying the mobile sales promotional staff of the "Guards" cigarette division of Carreras Limited. Sixteen salesmen, a group manager and their motor vehicles, one to each man, travelled together. Arrival in Glasgow next morning made possible a sales drive throughout Scotland. This is believed to have been the first occasion on which a special train has been commissioned for such a purpose. The Sales Manager of Carreras Limited pointed out that no other form of transport would have fitted so well into the programme. The use of a special train to move the group as a unit is stated to have enhanced morale. In Scotland the team divided into three groups, each allocated to a territory. All important towns between Aberdeen and the Border are being visited at least once during the six weeks' sales campaign.

British Railways entertain former and retired chief engineers. At the Great Northern Hotel, Kings Cross, London, on December 20, some of the former and retired railway chief engineers were entertained to dinner by the Regional chief mechanical and electrical engineers of British Railways. The accompanying illustration shows, front row, left to right: Messrs. K. J. Cook, Chief Mechanical & Electrical Engineer, Eastern and North Eastern Regions, 1951–59; F. W. Hawksworth, Chief Mechanical Engineer, Great Western Railway and Western Region, 1941–1949; Sir William Stanier, Chief Mechanical Engineer, London Midland & Scottish Railway, 1932–1944; Mr. H. J. Ivatt, Chief Mechanical Engineer, London Midland & Scottish Railway and London Midland Region, 1946–1951. Back Row, left to right: Messrs. R. A. Smeddle, Chief Mechanical & Electrical Engineer, Western Region; A. E. Robson, Chief Mechanical & Electrical Engineer, London Midland Region; R. C. Bond, Technical Adviser, British Transport Commission (formerly Chief Mechanical Engineer, B.T.C.); J. F. Harrison, Chief Mechanical Engineer, British Transport Commission; T. C. B. Miller, Chief Mechanical & Electrical Engineer, Eastern Region; W. J. A. Sykes, Chief Mechanical & Electrical Engineer, Southern Region; M. S. Hatchell, formerly Chief Mechanical & Electrical Engineer, Scottish Region.

Revised British Standard for signal lamps (B.S.469: 1960). In revision of the 1952 edition of B.S.469, the text has been rearranged to bring it into line as far as possible with other current British and international specifications. The list of lamps covered by the specification has been amended to meet present and future requirements. Lamps preferred are indicated in heavy type. Besides technical requirements, methods of test are laid down for determining quality and interchangeability. It is usually impracticable to test every lamp in a batch; the standard, therefore, calls for tests of samples. Quantities and quality levels are laid down. Copies of this revised edition, price 7s. 6d., may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1.

Brick knocks out train driver. The driver of a Glasgow train carrying 600 passengers was knocked unconscious, recently, by a brick as the train passed under a bridge near Kelvinhaugh Station. The driver struggled to his feet and brought the train into Yoker Station while still dazed. Later, 12 stitches



Present and former railway chief engineers at the dinner held at the Great Northern Hotel, Kings Cross

were inserted in a head wound. The driver thought children playing on the bridge had thrown the brick.

Railway Stock Market

Apart from a renewed decline in British Funds, which carried War Loan down to a new low level, stock markets have strengthened, no doubt, because sentiment was helped by the somewhat less depressing international news. There was no marked improvement in demand, but the foreign rail section reflected the better market trend with Antofagasta ordinary stock fractionally higher at 16½, while the preference stock was 34 compared with 33½ a week ago.

Costa Rica ordinary stock moved up from 33½ to 35½ ; the first and second debentures were 96 and 113 respectively. In other directions, Chilean Northern 5 per cent first debentures gained a point at 53½. On the other hand, International of Central America common shares receded further from $18 to $17, and the preferred stock from $105½ to $100½, but quotations did not appear to be tested by business. In other directions, Guayaquil & Quito assented bonds remained at 55, while Paraguay Central prior debentures were 17½ and remained fairly active.

United of Havana second income stock kept at 6, and the quotation for the consolidated stock remained at 1. Brazil Railway bonds were 4¾, San Paulo Railway 3s. units again had a quotation of 1s., but Mexican Central "A" bearer debentures receded from 59½ to 57½.

Canadian Pacifics have improved to $39 ; the preference stock was 59½ and the 4 per cent debentures eased to 60¾. White Pass shares were $9⅞.

Shares of locomotive builders, engineering and kindred companies participated in the better trend of stock markets. Activity continued in Gloucester Wagon 10s. shares, which, compared with a week ago, have rallied from 12s. 7½d. to 13s. 9d. Wagon Repairs 5s. shares, too, attracted attention advancing on balance from 18s. 6d. to 19s. 9d., but Charles Roberts 5s. shares remained at 8s. 3d. and Beyer Peacock 5s. shares at 6s. while Westinghouse Brake held last week's rise to 40s. 7½d. G. D. Peters were again quoted at 15s. 7½d., North British Locomotive eased from 6s. 6d. to 6s., but Birmingham Wagon strengthened from 26s. 6d. to 26s. 10½d.

Interest in machine tool shares persisted because of reports of increased activity in the industry. Compared with a week ago, Alfred Herbert have risen from 50s. 6d. to 54s., Coventry Gauge 10s. shares moved up from 23s. to 24s. 1½d., while Craven Bros. 5s. shares at 10s. 1½d., compared with 9s. a week ago.

In electricals, too, there were good gains, A.E.I. rising on balance from 40s. to 43s. G.E.C. improved from 29s. 6d. to 31s. 7½d., and English Electric were better at 35s. 3d., while Crompton Parkinson 5s. shares strengthened to 11s. 9d.

In other directions, Ruston & Hornsby advanced from 27s. 3d. to 28s. 9d., Vickers were better at 29s. 6d., and B.I. Cables rose from 49s. 7½d. a week ago to 53s. 7½d. Ransome & Marles 5s. shares moved up from 15s. 3d. to 16s. 3d., and Pollard Bearing 4s. shares from 29s. 9d. to 32s. 9d. Leyland Motors, still reflecting the record financial results, rose on balance from 80s. 3d. to 81s. 3d.

Tube Investments advanced strongly to 77s. 3d. Pressed Steel 5s. shares moved up from 25s. 3d. to 26s. 9d., and Dowty Group 10s. shares kept at 34s. 6d. British Oxygen 5s. shares moved higher again at 26s. 6d. and elsewhere, B.S.A. 10s. shares rose sharply to 39s. 7½d. Metal Industries gained 1s. at 55s. 6d. and T. W. Ward moved up from 65s. 9d. to 66s. 6d.

Forthcoming Meetings

January 13 (*Fri.*).—The Institution of Electrical Engineers, Utilisation Section, at Café Royal, at 7 p.m. Section Dinner Dance.

January 13 (*Fri.*).—British Railways, Southern Region, Lecture & Debating Society, at Battersea Town Hall. Annual Social and Dance.

January 14 (*Sat.*).—Railway & Canal Historical Society, at the London Transport Executive Library, London, S.W.1. "The Railways of the Forest of Dean," Mr. H. W. Paar.

January 14 (*Sat.*).—The Permanent Way Institution, East Anglia Section, at Cambridge, at 2.15 p.m. Paper to be arranged.

January 17 (*Tue.*). The Institute of Transport, at 80, Portland Place, at 6.15 p.m. Visual Aids Meeting. View and discussion of films, "Across the Borders" and "Hovercraft—the first year's development."

January 17 (*Tue.*).—The Institution of Civil Engineers at Great George Street, London, S.W.1, at 5.30 p.m. "A Civil Engineer and Town Planning."

January 17 (*Tue.*).—The Institution of Locomotive Engineers, at 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. "Spectographic Analysis of Crankcase Lubricating Oils as a Guide to Preventative Maintenance of Locomotive Engines." Mr. G. M. Barrett, and "Control of Quality of Crankcase Lubricating Oils of Locomotive Diesel Engines in Service," Mr. S. Baistow.

January 17 (*Tue.*).—Industrial Transport Association, at Lecture Theatre, Royal Society of Arts, John Adam Street, London, W.C.2, at 6.30 p.m. "Current Aspects of London Traffic Situation." Mr. A. Samuels.

January 18 (*Wed.*).—British Railways, Southern Region, Lecture & Debating Society at the Chapter House, St. Thomas' Street, London, S.E.1, at 6 p.m. "Continental Affairs." Mr. R. E. Sinfield.

January 18 (*Wed.*).—The Institution of Electrical Engineers, Supply Section, at Savoy Place, London, W.C.2, at 5.30 p.m. "A General Method of Digital Network Analysis, particularly suitable for use with Low Speed Computors," Mr. M. N. John; and "Digital Computors in Power System Analysis," Mr. P. P. Gupta and Professor M. W. Humphrey Davies.

January 18 (*Wed.*).—Peterborough Railway Discussion Group, at Peterborough Technical College, Eastfield, at 6.45 p.m. "Contracts in Progress, Mitchell Engineering Limited," Mr. W. T. Druitt.

January 18 (*Wed.*).—Railway Students Association, at London School of Economics & Political Science, London, W.C.2, at 6.15 p.m. "Railway Signalling Developments and Modernisation," Mr. A. A. A. Cardani.

January 19 (*Thu.*).—Diesel Engineers & Users Association, at the Institute of Marine Engineers, London, E.C.3, at 2.30 p.m. "The Evolution and Trend of Development of Air Cooled Diesel Engines," three papers, Mr. J. Smith, Herr. W. Luderitz, and Mr. M. F. Clover.

January 19 (*Thu.*).—The Model Railway Club, at Keen House, Calshot Street, London, N.1, at 7.45 p.m. "Branch Lines near Bedford," Mr. F. G. Cockman.

January 19 (*Thu.*).—The Institute of Transport, Northern Ireland Section, at the Grosvenor Rooms, Great Victoria Street, Belfast, at 6 p.m. "French Tourism," Mr. O. J. Trenner.

January 19 (*Thu.*).—The Institute of Transport, East Midland Section, at the Co-operative Society's Elizabethan Restaurant, at 1 p.m. "Demand prospects for freight transport by rail and road," Mr. M. Brown.

January 19-22 (*Thu.-Sun.*).—British Railways, Southern Region, Lecture & Debating Society, North of Ireland Tour.

January 20 (*Fri.*).—The Institute of Transport, Tees-side Section at the Cleveland Scientific & Technical Institution, Middlesbrough, at 6.30 p.m. "Rivers and ports—planning for the future," Mr. J. S. B. Gentry.

January 20 (*Fri.*).—The Institute of Transport, Western Section, at the Old Council House, Bristol, at 7.30 p.m. Film display.

January 20 (*Fri.*).—The Institution of Electrical Engineers, Educational Discussion Circle at Savoy Place, W.C.2, at 6 p.m. Discussion: "Management Studies for Junior Engineers."

OFFICIAL NOTICES

AGENTS, Senior and Junior Site Engineers required for Railway construction contracts in various parts of the country. Must be experienced in the use of surveying instruments and capable of controlling projects. Position is permanent with Pension Scheme and car to Senior Engineers.—Apply Eagre Construction Co. Ltd., East Common Lane, Scunthorpe.

ASSISTANT TO THE RAILWAY ENGINEER required by large Steel Works, to prepare and implement schemes for new track layouts, diesel locomotive repair shops, etc. Permanent position for man age 24/35 with opportunity to gain practical experience including routine maintenance. Must be able to prepare accurate railway layout drawings. A salary commensurate with the age and qualifications of the applicant will be paid, also assistance with removal expenses and temporary lodging allowance. Pension scheme and staff canteen facilities available. Apply to Personnel Manager, Round Oak Steel Works, Brierley Hill, Staffs.

Foreign Employment

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ENGINEERING GRADUATE preferred; minimum of two years engineering training essential.

Require two years varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45-mile railroad assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

Excellent opportunity large copper company, Chile, South America. Two year contract with transportation both ways for you and family. Basic salary $525.00 to $650.00 per month depending upon age and experience of applicant.

Box 6, *The Railway Gazette*, 33 Tothill Street, S.W.1.

18 AEI DIESEL ELECTRICS ALREADY SUPPLIED—NEW ZEALAND NOW ORDER 20 MORE!

Eighteen of these AEI locomotives have been supplied to New Zealand Government Railways.
A further 20 sets of Power Equipments have now been ordered for fitting into Railway built mechanical parts.

The above illustrates one of the many traction orders carried out by AEI Traction Division, an organisation which has provided electric main line and industrial locomotives for many parts of the world.

All enquiries should be addressed to the local AEI office or direct to AEI Traction Division, Trafford Park, Manchester 17.

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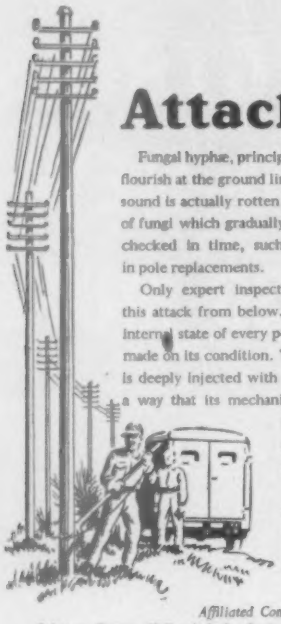

Attack from below

Fungal hyphæ, principal cause of pole destruction, breed and flourish at the ground line area. Many a pole that *appears* to be sound is actually rotten inside, honeycombed with a network of fungi which gradually eat away the inner structure. Unless checked in time, such damage costs thousands of pounds in pole replacements.

Only expert inspection and early treatment will defeat this attack from below. Under the Cobra Service, the exact internal state of every pole is ascertained and a detailed report made on its condition. Where treatment is needed, the wood is deeply injected with powerful antiseptic chemicals in such a way that its mechanical strength is unaffected. This preserves the pole from decay and extends its life by fifteen to twenty years.

All equipment, operators and transport are provided by the Cobra Service, and there is no interruption of the normal line supply.

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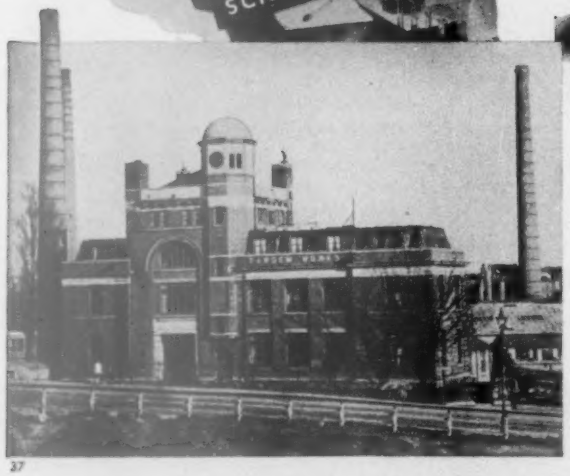

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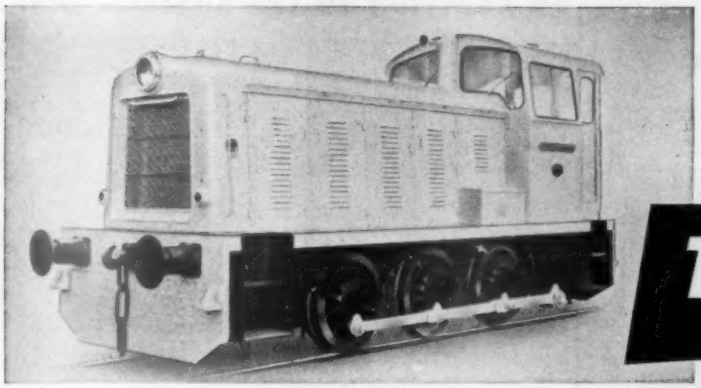

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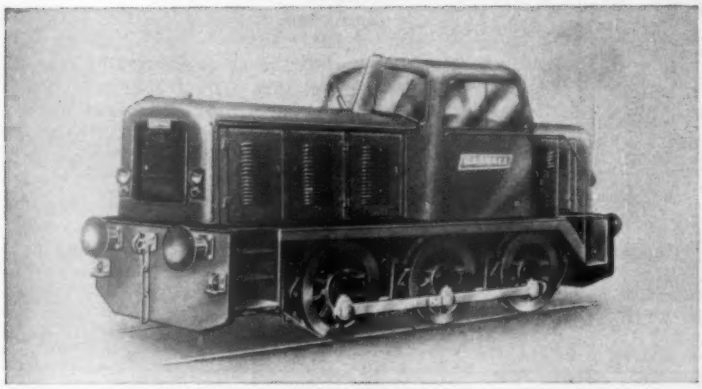

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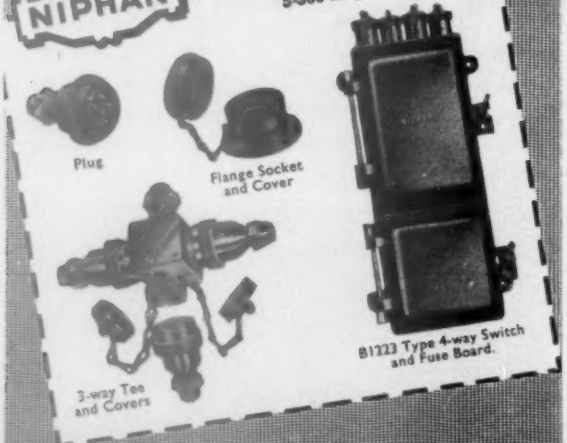

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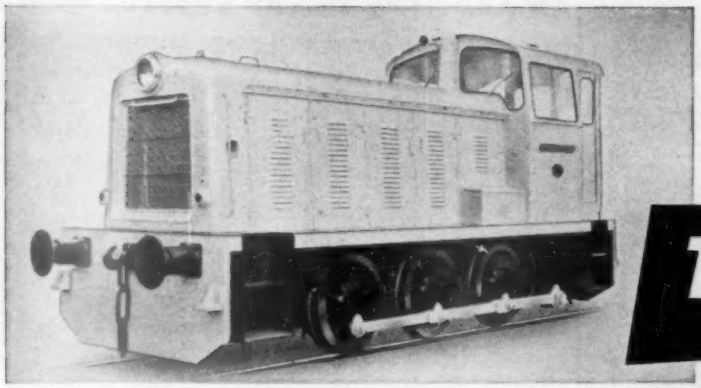

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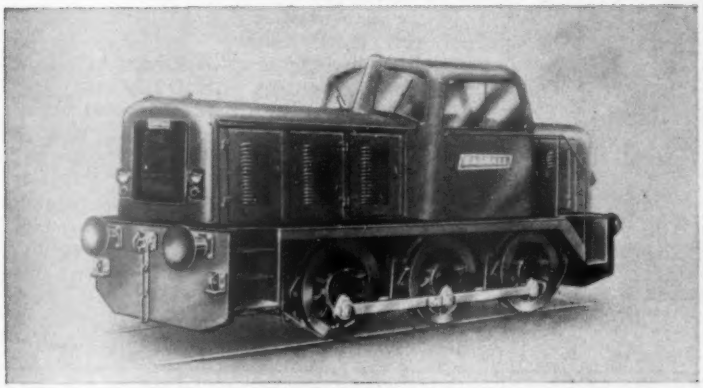

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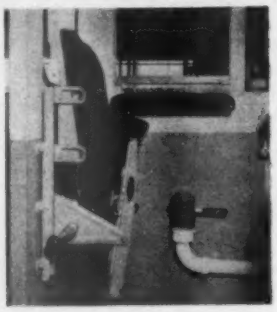

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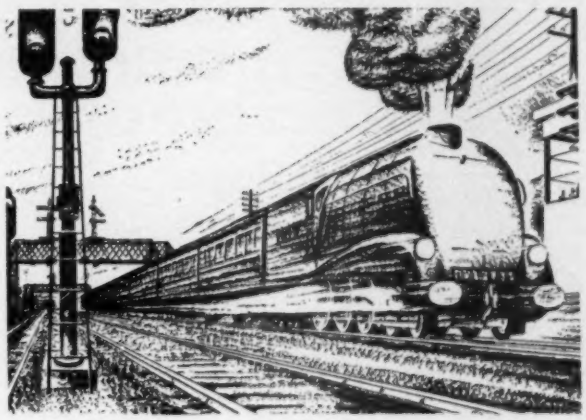

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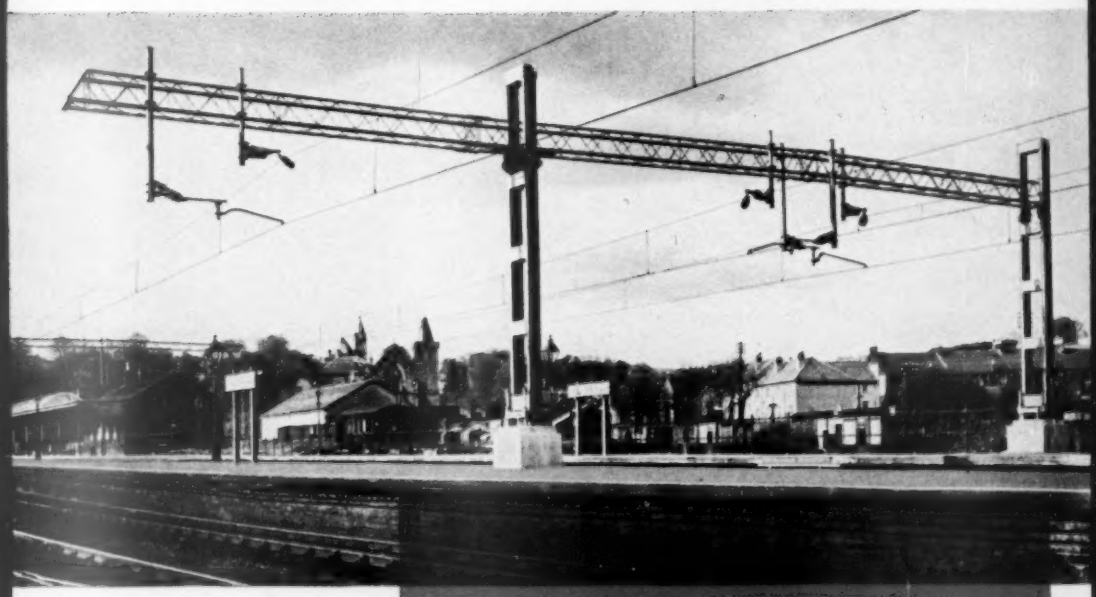
January 13, 1961

a special structure

To counteract the effect of mining subsidence



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